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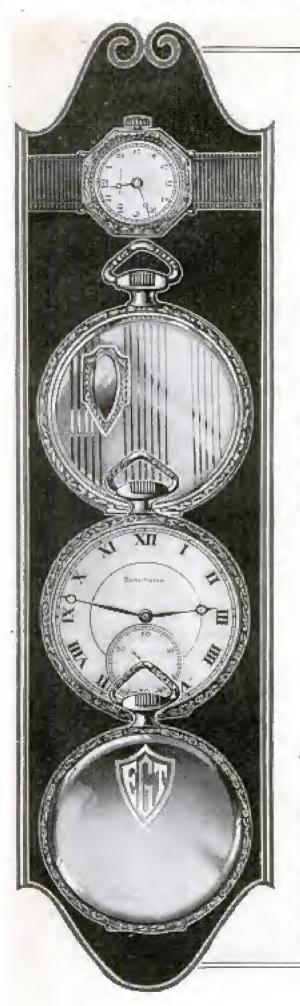
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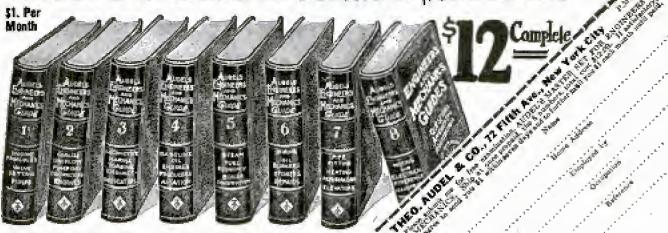
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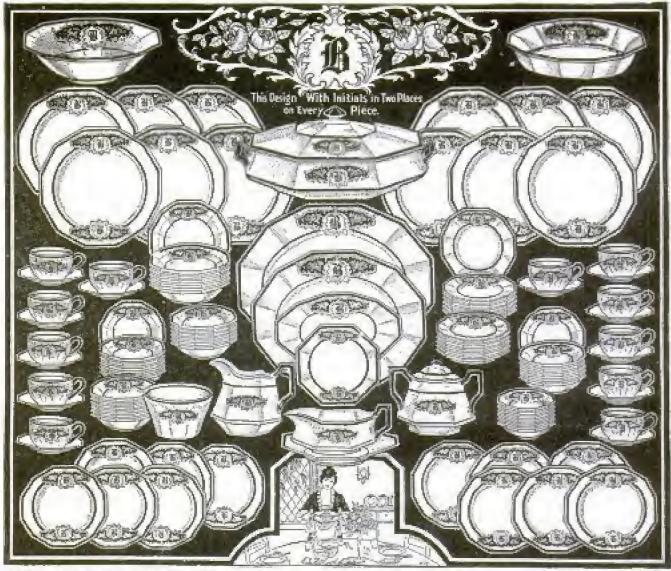
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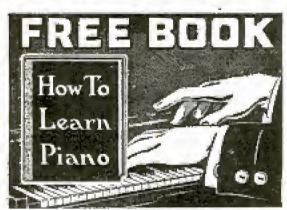
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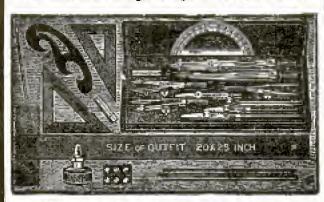
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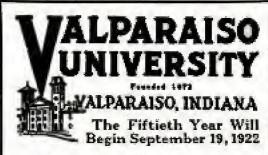
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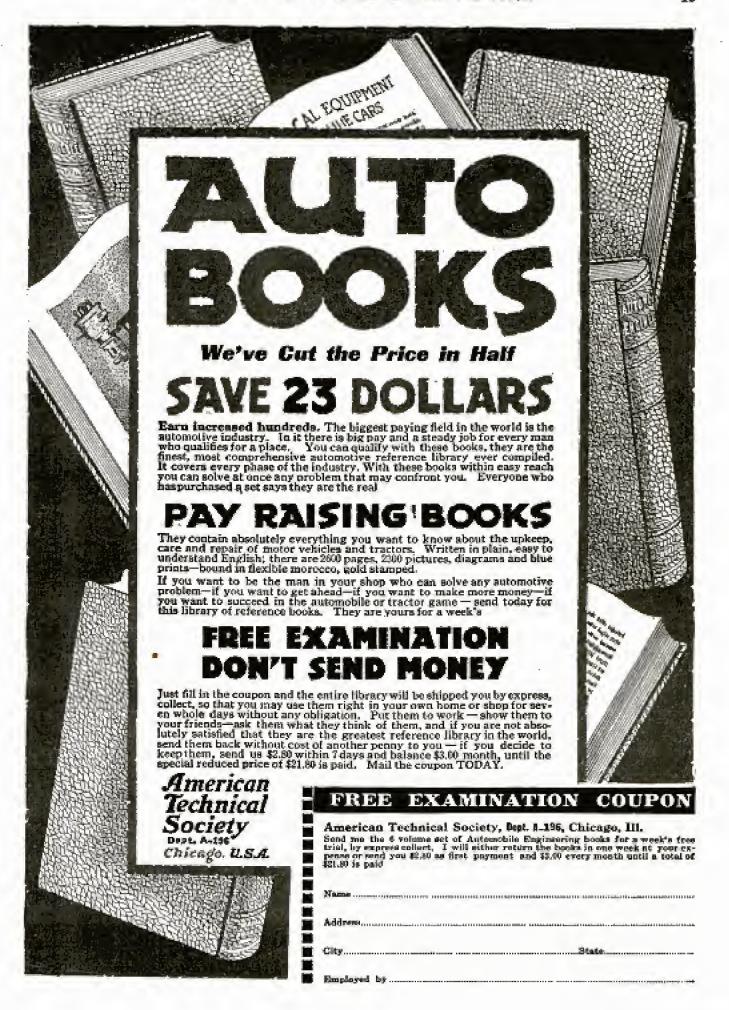
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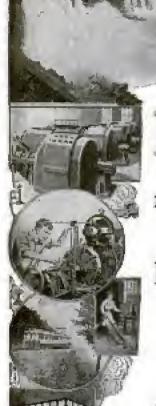
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WE want men and warmen who are destroire of making \$25.00 to \$250.00 per week clear profit from the start in a permanent business of their own. Michelife Margel Washing Changetin Washing chapter in the profit of the spotter of their own. Michelife cluthes apodesely clean in ten to fiftern minutes. One hondred other mea in every mone. Nothing the late it. National inglitiest changer. Contains no try. Investigation of wax. Pres Samples make \$225.00 per coll or wax. Pres Samples make \$225.00 per coll or wax. Pres Samples make \$225.00 per coll or wax. Pres Samples and the Sales stay. Enormals repeat orders—300% profit. Excitative tearings. We guarantee sale of every package. Two other "algist subjects" and stare repeaters give our agents the restep to the main \$200 had not in the country. No rapital or experience required. Baker, Onto, mate \$200 had not in the country. No rapital or experience required. Baker, Onto, mate \$200 had not in the country. No rapital or experience required. Baker, Onto, mate \$200 had not proof. L Michell & Co., Desk 7d, 1202-1314 E. 61st, Chi-rago, ID.

LAYE flavorsentatives Wanted: Accepts.

Live Representatives Wantes!: Agents, ever managers, salesmen, distributors, side ling men gird hause to house commence who desire a splendled opportunity to make big accept with "Tearless Mineers." This is a product that every honorrife wants. Now on sale at all State Strees Department Stores, Chicago, also handled by dealers and febters of consequence, Agents working alone are now making \$12.50 to \$20.00 per day. Crew maxingers are estining at the product of \$10.400 annually to having a small crew working from house to house. If you have the ability that experience and are tooking for something good, write for our Agents Proposition. It is a Big Money Maker, The Ernest Belef Company, 331 W. Matthew St., Chicago, Illinois.

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MONET - Money - Money! Make it religing Hanglick, the new and universalish hand-cleaner - the original powdered hand some! Bemores growe, grime, tak, pains, etc., without injuring akin. Spreads like whichies, Cheaner than all others. Sells in cares for bulk with dispensers to garages, autoists, auto expuly retements, mechanics, factors and office folks, to housewise, hardware apores. Huge quantities used weekly by mereantile houses. Big repeal business assured. Enclusive agencies, crews working for you, face seles, selential profits, permanent business for husters. Live ones can clean up \$100 a huseth, for the (exture slamps) for fiberal sample can. Complete sales plan gess with it. Write quick to Solar Products Cot., 124 W. Lake St. Chicago, III.

MAKE \$55.00 per week and up selling our fine, made-to-measure, all-wool sulls at \$29.50 retail, direct to usarer; biggest talls ever offered; positively sell on night; liberal profits paid in advance. We attend to delivery and collections. We fit at once, giving full perticulars as to your post experience. Full line of ramples and everything on week with will be sent with the least possible delay. W. Z. Gibson, Inc., Dept. J-142, 101 W. Harrison St., Chirago, Ill.

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Company. Dept. 352. Chicago. III.

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TALLORING Salesmen: Make \$75.00 a, week celling our strictly All-West Made-to-Measure Suits at \$20.50, Yes cellect profits in advance and keep them. We supply finest Selling Outlit in America. Many excusive money-making features. Tailoring, raincoat and side-like man, part at full time, act in touch with us immediately. Goodwear Chicago, fine. Dept. 131, 813 W. Adams St., Chicago, Ill.

AGENTS Wanted Ch. 31, S. outz., Make-You cones.

You cones.

M. We sup-

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\$10 TO \$20 daily taking orders for new anto limitalian that removes carbon, stopp and purophys and parce \$25 on gasoline. Sells on sight to every ear owner on our numer-back guarantee. Everylady can afford to \$2.00. You make 100% profit, Writen for five sample hookirs. Address Warren Mig. Co., 453 Gray Ithig., Kainaas Circ. Ma. Warren 7

STAIRT in a permanent business of your own sching guaranteed lindery and Underwest direct from mills. No capital or experiment is bearing today representatived make \$1,000 to \$5,000 per rear. Removed directs manager—get others working for you. Write for details to Malhach Kultung Mills, \$29 Crant St., Grand Rapsias Mich.

WOLLD you like to receive a bountied 21-place genuine French from manboure set, 26-place Engine placeware set, or elegant 21-jewel gentlemm's or ladies' wrist watch at hour of the above given free fee only an bour of your space time; very easy and interesting. Write Welmann Bros., Mentalia Term. phie. Tengi.

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AGENTS-\$15 a dup-Easy, quick sales— Free Auto-Hig weekly brains—\$1,25 pre-mium free to every customer. Simply show our heatefful, 7-phose, suifed aboutdatus heatefful, 8-phose, suifed aboutdatus braidle cullery set. Appeals instantly. We deliver and relicet. Pay daily. New Est. Mrg. Co., \$03 Madison St., Dept. 21-C. Chicare. Chicago.

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etc. Write techay for Moner-Making Plan,
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Bidg., Cincinnasi, Ohto.

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AGENTS, programms mulita, performent re-post bushness, exclusive territory, solding highest quality predicts at low prices. Co-count GI Shanipso retails 50c battle, mass, \$1 dozen, Scape, Perfumes, Extracts, etc. Vending, A-16, East 12th, New York, N. Y.

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"Golden Besnit," Combs, Kind, you can
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HOW to make, bottle and sell all kinds of Fosel Flavers, both liquid and telles. Crystabnist, greatest washing compound known to science. Maple Syrup at 50 sents per gallon. Our hook "How" tells \$1, 50 cents. Coupon good for this assente on first contex. Order tells, N. Y.

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MAKE \$5,000 every pear—\$2,000 in spare
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AGENTS — Signs of all kinds. Big money-making line. Prices right. Address Atracia Sign. Works. F. Cirom P. O. Chicago.
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A BIG Motory Maker and 4 Pleasure for

A BIG Montay Matter and a Pleasure for Men. Women and Children. You can nake the most beautiful Marble. Turnwolce. Agate, The and an work frem common Purthand Concept, also beautiful sictores, pleture frames and structs. I will also tell you have you can make from twenty-five to one handred dollars in an hour's time after learning how to do the work. Will pay free dollars if you cannot do the work by following instructions. My twenty-five collar course of instructions for twenty-five cents after. Based on 49 were experience. B. F. Spencer, Instruction Dept., Eisinore. Calif.

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GERMAN returns for horhers. Hami-made, Mangarere steel. Highest quality, fuaranteed. Self for \$2.25. Cost you \$13.56 dox. Sample, \$1.45. Meery Order, Schwartz, Importer, \$80 East 141st Street, Citerciand, O.

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ONLY one polity a day means \$130 per month profit; same on renewals. Policy pass \$5,000 death; \$25 weekly benefit for injury or stekness. Premium \$19 yearly. Full or space time. Easy soiler. Write quick for territory. Underwriters, Dept. K-33, Newark, N. J.

WE want emetioned salesmen to sell our line of advertising materials and service to backers, marnialits, manufacturers, wholesafers, and other well rated concerns. The men we want must have some successful experience selling to business them, and much have ambition and a williamness to work for the development of a permanent and predicted business. Leads and recapitable business. Leads and recapitable sells being furnished. Liberal complications with weekly reinitiations. This is no soft map but a real business proposition for resipetral men tooking bigger operaturalities. Let your letter of application references. The American Art Works, Coschocion, 6ths.

MAKE 550 daily Semestime need 40000

MAKE 850 daily. Something new! 400% profit. All business, professional men med it. Soils 35. Costs 31. Brooks, Tesos, soid 29 first day, profit 380. Big weekly repeater. Sells quickly. Experience unnecessary. Write pulsy for terributy wanted. Sample outfit free. Federal Association, 71-1) Authors St., Hartford, Costs.

AGENTS—J. B. Simpson, \$29.50 virgin was tallured to order surits—overcoats are \$59.60 cheaper than store prices. You keep deposits. Protected territory. Beautiful assortment of fabrics—630 swatchest free. Husilians write J. B. Simpson, 821 West Adams Street, Chicago, Dapt, 196.

SALESMAN Distributes — Establish per-mailent hisiness. Household article. Sells readily. Our liberal discount allows dis-tributers handsome profit. Other distribu-lees making good. Write tuday for ex-clusive distributer proposition. Crown, Rich-mond. Ind.

CLIMAX Off Burners wonderfully recess-ful in residence furnaces and stores. Also Oasek Filters. Lilieral proposition, Ad-dress. E. L. Miller Mrg. Co., 2231 West Ehind, Kansas City, Mo.

SIDELINE; Haby Shoe Specialties to trade. Little Chick Shoe Company, Chiengo.

Chicago.

SALESMEN Wanted—Our suits, orbrousts blankers, work points, radinosats are made in our own factory from woolens that defy all competition, Fabrics and talloring are the finest, if you have a clean record, stand well in your community and can spare 2 bears a day or more, you can add \$25.00 to \$150.00 per week to your present income, No experience or capital required. For full particulars write Taylor Wellis Co., 1749-A Discree Parkway, Chicago, III.

HIGH-GRADE Specialty Ballesmen

HIGH-GRADE Specialty Salesmon Wanted-Sameshing New-Fire Fighter settle easily. Makes a speciacular demonstration; car owners, homes, factories, states, praying the first per sight. Our men make \$10.00 to \$50.00 a day; exclusive territory. If you wish, to establish a linguises of your own with unlimited possibilities for making big innessy, write to today, Pyr-Pyter Co., 850 Fyr-Fyter Edg., Dayton, Ohio.

SIDE Line for Salesmen: The Kern Card and Label Holder; used in all business having merchandles on shelters as greenies, stockhondus, acrossory sheets, etc.; outfit carried in pocket. Address John Ph. Kern. Dept. M. 1205 W. Market, Louisville, Kr.

SCHETHING New—a necessity—Zim's Peeriess Collection System, Salamon making hig money, Engineer collecting features and salamon. Creditors Association, 312-E McKnight Edg., Mismeapolis, Mism.

SALESMEN, Local or traceling, can make \$10.00 a day selling our new, practical advertising specialities. Pentile, yard-sticks, kites, terpicks, sheshorns, etc. Attactive outfil. Excellent "side," Soil year round. Liberal terms. Pershine Mrg. Co., Spathland, Ind.

AMBUTIOUS Men, with today for attractive proposition, selling subscriptions to America's most popular Automobile and sportsmen's megazine, Quick asies. Big profits. Pleasant work. Digest Pub. Co., 9505 Butler Bidg., Cincinnati, Q.

SALESMEN make good side money reli-ing small accipient forch to garages and shops. Easy to sell. St. Paul Welding & Mrg. Co., St. Paul, Minn.

SALESMEN Can make 15.00 a day sell-ing our Calendara, Fancils, Signa, Advertising Nevertice. Yardeticks, Whitalies, etc. Liberal terms. Sells entire year. Fine side line. Local and traveling agencies. Model Calendar Co., Dept. 226, South Hend, Ind. SOMETHING New, a Decessity. All business and professional incs need it. Sells \$2.50, costs you \$1.40. Big repeater. Write for sample. Marchaints Assn., Minneapolts, Minn.

ELAKE big muony solling new, self-adjusting Rebert Wrench. Most wonderful tool on market. Sells for \$1.85. You make almost 140% on each. No free samples. Rebert Wrench Co., 71-C Mutray St., New

MNUTES pay dollars demonstrating world's greatest specialty. Wonderful new tince-pound Adding Machine. Betails \$15. Work equals \$300.00 machine. Adds. subtracts. unfitted of the subtracts. unfitted at the subtracts. Specify, accurate, durable, handsome, Fire-year Guarantee. Tremendous demand cresywhere, Amazing predis, main or side-line. Experience unnecessary, Writin quick for tiberal trial offer and protected ferriary. Lightning Calculator Co., Dept. G. Grand Bapids. Mich.

AGYNTS—540-\$200 a week. Free temples, Gold sign letters augene can jud at store windows. Liberal after to general agents. Metallic Letter Co., 431-E N. Clark St., Chicago.

EVERYBODY Eats Every Day, You can bandle Sugar, Flour, Canned Goods, Dried Fruit, Coffee, and entire line of generics, as well as Paints, Roofing, Aluminius Ware and Automobile Olfa, with no rent to pay; no money invessed; this large orders from eximples. Goods are guaranteed and morem quality. Selling experience not necessary. Sizady, profitable work for "workers." Address Hischock-Hill Co., Dept. 200. Chicago, III. Reference: Any Bank or Express Co.

57 MILES per gallon made with new pat-ented gasdine Vaporizer. Write for par-ticulars. Vaporizer Co., Pukwana, S. Duk.

CALIFORNIA Resolved selling like hot cakes, Agents coining money. Absolutely new. Big profits. Catalog free. Mission, 2421-SP, Smith, Detroit.

EASY to sell Groceries, Peints, Automobile Oils, Reofing, Stock Food, to consumurate me samples, no capital or experience accessory; steady, profitable work. Commissions advanced. Satisfaction guaranteed. 50 years in hustiness. Write for full particulars. Loughn & Browne Co., Wholesaid Grocers, 1775 S. State Street, Chirago, 31,

BEST Seller; Jem Bubbar Repair for three and tules: supersedes ruleanization at saving of over 800%; put it on cold, ruleanizes fiscall in two minutes, guaranteed to hist life of sire or tube; sells to every note owner and accessory dealer. Get particulars how to make hig meany and from sample. Ameson Rubber Co., Philadelphia, Pa., Dept. 540.

#### HELP WANTED

WE want a few more men to take at deta for our one-piles Line of Tailoring offering All-Wool Made-to-Measure Suits guaranteed \$50 values at only \$20.75. Every order you take page you a good profit, in advance, Experience not necessary. Husters can clean up big. Write today, Park Tailoring Company, Dept. 354, Chicago, Hi.

Company, Dept. 354, Chitchen, III.

WillAT is it worth to you Distributors—
Distribl Manager—Salesman or Agent to have the accuration that have the accurate for the best line of Rubber Specialities on the market? Hot Water Bottles, Bathley Caps, Combination Shopping Maga, Pure Rubber and Robbertzed Agrous, Righber Glooss, and fifty other fast selling articles needed in every home, Profits range from 160 to 150 per cent. Write B. & G. Rubber Mig. Co., 618 Penn Ave., Pittsburgh, Pa., Dept. 514.

WANTERS—More and Wanter Agents.

WANTED: Men and Women Demnistrators in historiam, take orders, make deliveries, 150 household necessities. Food products gained, extracts, talket articles, etc. New used by 20 million consumers. Large profits. Our system gets the business. No capital sequired. W. T. Rawleigh Co., 938 Liberty St., Frequent. III.

SALESMEN—Become Independent. Own.

SALESMEN—Become Independent, Own pour business; experience unnecessory; selling our \$7.500 Accidental Death, \$30 Accident, \$25 Suck Weetsly benefits; \$12.50 years to the amounts proporthouses. Guaranteed standy become from renewals. \$250,000 deposited insurance Department. Registration Deat A. Newark N. J. Hon Dept. A. Newerk, N. J.

DISTRICT Managers—Big profits, norm rapable of organizing and naturality events of lady soficitors, can easily citer \$100 to \$200 per week with the B. & G. Protester, the original and best protester on the matter. Every woman media and buys it. Two grades. B. & G. Rubber Co., 613 Poundavenue. Dept. 512. Pictologen. Pa.

SALESMEN—Independence awaits the line wites who greap this expectantly. Warehouses, terminals, steamably companies. Pactories, hotels, cafes, etc., are desporately in media of seteminated of external action of rate and mice; grateful ellents and long contracts await to the contract of extensions. The latter laboratory. Best. mice, early a small shock; remainisting only. Wette today. The Hatin Laboratory, Inc., 115 Benial \$5, New York City, N. Y.

MEN—Boys over 11. Get U. E. Govern-

MEN—Buys over 17. Get U. S. Government pasithess. \$12-\$192 insuffic. Quick, northale. Steady work. No "lapaifs." No strikes. Sure pay. Life positions. Work pleasand. Paid reaction. Common education sufficient. Influence unnecessary. List positions outly obtained—free. Wells today sure. Promot action advisable. Franklin Institute. Dept. H-8, Bookester, N. Y. WANTED—Mon. pter. 17. Relives mail.

WANTED—Men over 17. Railway multi-clerka. Travel. Commence 31%2 month. Steady. Common education sufficient. List, positions free. Write immediately. Frank-ita institute, Dept. H-21, Rochester, N. Y.

START a greening cleaning and dysing ship, excellent field, splendid profits. Wo tell you how, Write for booklet. Hen-Youde System, Dept. C, Charlotte, S. C.

EABN \$16 daily elivering inferiors, plating and refinishing metalware, autos, chande-flors, bedspards, headilghits, dudies fursished, E. Decis Laboratories, 1123 Broadwar, New York, N. Y.

MKN, Women, every 18, desiring Commission resistances and up, write immediately for full information. Chicago Civil Service College, A-41 Kesner Building, Chicago, \$92-\$190 MONTH, Men-herz, orre 17, Government election folia. Steady. List positions free, Write Franklin Institute, Dayle H-21, Rochester, N. Y.

HOME employment evenings. Start little Mail Order business anywhere. Stamp brings Instructive Booklet. Arthur Pier. 72 Cortlands Street, New York.

WANTED—Men over 17. \$135-\$105-mouth, Ballway shall clerks, List pusi-tions free. Franklin Institute, Dept. H-21. Buchester, N. Y.

FIREMEN, brakemen, bagragemen, sleeping car, train perture (microsit, \$114-\$200, Experience unnecessary, \$10 Radiway Bureau, East St. Louis, III.

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BOYS-men. Recome automobile experts. 145 week. Learn while carning. Write Franklin Institute, Dept. H-401, Rechester,

MEN-Boys—Wanted, Rathery mail clocks. \$145 month. Write innicillately. Franklin Institute, Dept. H-21, Ruchester, N. Y.

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1.4493049717E Firemen, beginners, \$158.

LOCOMOTIVE Firemen, besinuers, \$150, later \$250 monthly, for relifereds nearest their houses, exerywhere in United States and Canada, Address Ratiway Association Desk M-1, Brucklyn, N. Y.

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AMERITOR'S Men, write tickay for hitractive proposition, selling subscriptions to America's most popular Automobile and sportsman's magazina. Quick sales. Big profile. Pleasant work, Physic Pub. Co., 9846 Butter Edg., Cincinnate. O.

MEN manuel to quality for Pirenou. Brakenen. Transportation furnished. Write W. Bragnes, St. Ernis.

WANTED: Ballway Mail Clerks—\$1,400 to \$2,300. Exams everywhere. Write leday for full information. Patterson. Cleil Sevrim Expect, Box 4025, Ruchester, N. Y.

SIGN Letter Agents and Pulmers: 500% Peoft. Geld and Silver Sign Latters for Startes and Office Winglows, Anyone can put on. Big demand. Free Samples. Me-tallic Letter Co., 421D N. Clark St., Chi-

Alls men-momen over 17, willing to re-cept Cavernment Position, \$125 (Traveling or Stationary), with Mr. Osment, 101 St.

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SILVERUNG instrons, French plate (augle, Kasy to learn, Immense profits, Plans free, West Mitror Works, Expelsion Springs, Mo.

ENPTED States Government Wants Men. Excellent positions at altractive salares. Railway Mail Clerk Examination arous. Let our expert Hermer United States Cles). Service Examinent prepare roo for this and other flue positions. Write today for rec catalog PM. Fatterson Civil Service School. Rochester, N. Y.

School Receiver, N. Y.

III a Railway Truck: Inspector 1 \$116 to \$250 monthly; expenses past after 2 months' spare-time stocky. Splendled engertunities. Position guaranteed or money refunded write for free booklet CM-46. Stand. Business Testing Inst., Buffale, N. Y.

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WRITE Articles, stories, nows, in spare time for newspapers and magazines. Big Per. Coporight book free, Press Syndicate, 552, St. Leuts, Mo.

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INVENTORS desiring in secure patents should write for our book, "How to Get Your l'atent," tells our terms and methods, Send skylch for our apinion of its patentatic nature, Randelph & Co., Patent Artorneys, 620 F. Washington, D. C.

OUR penuine gold window sign letters are an overflest homes-making proposition for handy men. Slam Sign System, St. Antaina St., Detroit, Mich.

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BLOTTERS will advertise your business or product. Samples for stamp, Laborro Company, Philisten, Pr.

CLASSIFIED advertising brings many in-quiries—big profits. Agents: galesman; basiness: for sale, Catalogue of leading publications, Send stamps, Dept. One, Climax Advertising Agency, Clinton leval

LET us get up some tral sales-producing literature, letters, etc., for you. We specialize on direct circular canagaigns. The Wolker Company, Landsville, Ex.

ADVERTISE in 24 hig Sanday Newspaces, 25 words \$65.40. Catalog listing 1,000 leading Dailies, Weekler, Magazines, 4c slamps, Ulson Advertising, Baltimore Bidg., Chicago.

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THE creating of a good impression is one of the most profitable forms of advertising and a very good way to create such result is by the judicious use of Morean Signs. Morean Aluminum and Bristop Case Signs and Monockal Tablets are Everbeding. Beanenthed and Artistic, Circular upon request. Morgan Sign Co., Dept. K. 402 W. 57th St., New York Chy.

#### INFORMATION

JUKEFARLIS information furnished on any subject or indice retunded, The. Co-opera-tive Service. Times Plaza, Box 884, Brack-lyn, N. Y.

PUZZLE contestants' lists of B. C. P. R. and S. Words. All words possible objects; single flet \$1.00; all for \$2.00. Fred f. Conner, IN Bession Are., Youngstown, Ohio.

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LITERARY Assistance, Propure speeches, befores, escential articles, letters. Proopt expect service. Authors Research Buseau, 500 Fifth Avenue, New York.

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SALES letters, \$5.50. Write fully. Ja-colous Advertising, Traington, N. J.

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WE found \$9.000.00 recent sales. Names of our cural mail-order customers, \$3.50 per 2.000 names; \$1.50 pech additional bousand. C. B. Datis & Soc. News & Products, 614 Jefferson. Greenfield. Ohio.

HOUSEWIVES \$1.00 thousand; recent weddings, and owners, arents—\$2.50 thousand. Catt product any list, Miller, Box 41. Berwick, Pa.

1,000 1922 MIRADLE vestern mail-order topers, \$3.00. D. Ja Sauborn, Einstonet. It.

20.000.000 NEW names! Authentic, re-liable lists are order publics, Martineko Colopaky, Curuna, N. Y.

800 GARAGE dealers, establishments, flyo states, \$2 100, F. Mason, Whitewater, Wis-

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TYPEWRITERS. All Makes. Save one-half. Thoroughly Rebuilt in our factory by the famous "Young Process." Fully guaranteed. Free trial. We handle all standard makes. Cash or gold on easy turns, Write for Calador. Young Typewriter Co., Dept. 412. Chicago. III.

ENDERWOOD Typewriters at for less than manufacturers' price; rebuilt, all worm parts replaced, guaranteed good as few. Cash, installment parents. Wite for Cataling 1516. Typewriter Emperium, estab. 1802. Mantrose and Rusenswood Are. Chicago, III.

RIJUSONS, 21c. Visible males. To writer Supply, 2927 Colfas Av., Chicago.

TYPEWRITERS, all wandard makes, \$10 up. Fully guaranteed. Free trial, Write for illustrated Bargain List. Northwestern Typewriter Exchange, 320 West Gorthe St., Chicago.

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YOU can make 50 to 100 copies of a let-ter, notice, etc., on these mata' worth of Beyor Quality Compound. Write for free ratalog and samples. The Heyer Duplicator, Co., 162 N, Wells St., Chicago.

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NEW 33.50 Automatic Adding Machine, Addis, Subtracts, Multiplies, Absolucely necurate, Capacity \$500,900.99, Fully guaranteed, 75.000 pleased users, Makes adding casy, positive, quick, Eliminues Mistakes, Sares Time Postpaid, \$2.50, Bassest Co., 1488-II, Hollywood Ave., Chicago.

PRICE Trial, Morvalous new Adding Machine, Adds, Subtracte, Multiplies, Divides, automatically. Work counts \$350.00 machine, Princ cell \$15.00. Specify, durable, hambeone, Fire-year generative. Used by largest corporations, White today for catalog and free trial offer. Lightoning Calculator Co., Dept. E. Grand Rapids, Mich.

#### PRINTING, ENGRAVING AND MULTIGRAPHING

1000 10 LB. Bond Besterheads printed for \$3,75; 5000, \$17.50. Multigraphing: 5000 \$12.50; 5000 cureleges, \$17,50. United Sales Company, Aberdeen, So. Dakota.

Sieu CHECLLARS, 535884, 56.50; envelope elips, 54.60, Samples, Bargain list free, Gand's Printery, Harrisophurg, Va. fire.

1,000 HAMMERMILL, Letterheads or Envelopes, \$4,00, Full Line Sampler Prec. Quality Printaliop, Marietta, Okto.

EMBOSSED besiters, personal stationery. Samples, atump, Daniels Company. Piltston. I'm.

200 KOVEI, letterheads and 200 ense-loges, \$1.25; 5,000 letterheads, \$40,40; 5,000 entelopes, \$1.40. Postpold. Champion, Wannatota, Wis.

PHINTING—"The Better Kind," Get our samples and estimates. Subsement wanted. Digwtep's Press, Detroit. Minn, GEMMED Labels II Bubber Sumps!! Interesting Samples Free!: Edward Hartison, "Attractive Printles." Baltimore.

100 LINEN thrish bond note sheets and 100 envelopes to march, primed with three-line address. St. 00 prepaid. Other printing of equally attractive prints, Samples free. Burrill Printing Co., Kantokee, Ill.

DUOFOLD Size Business Stationers paper. 1%x10%, eurelopes, 3%x7%, watermarked Markinac Bond fainted with your name and address on 100 sheets and 75 envelopes, \$1,50 delivered. West of Denner 10% extra. Rept. F. Forameant Paper Co., Kalamassa, Made Mich.

5,000 BUND letterheads or correspond \$12,50. Trial offer 250 each, \$2,50, post-poid. Address, Spafford Company, Matt-rille, N. Y.

WEDDING Institutions and Amounte-ments nearly printed. Write for samples, prices. William Helm. Printer, 2138 N. Sayre Arc. Chicago, III.

ONE Thousand Letterhoods or Envelopes, categoraried bond, \$3.75. Sample free. The Automatic Print Shap, Newcastle, field.

REDUCISO prices for better printing, 1,000 floral letter-bends, \$5.00; 1,000 good curelopes, \$4.25; 1,000 four-page folders, 3½,25% forther, 312,00. Catalogues, exculars, booklets our specialty. All printing at radiced peters. Samples free, Fantiss, 525 S. Deurborn St., Chicago.

100 LINES fluish note sheets and 100 envelopes to match, nearly imprinted your three little Edwards \$1.00 prepaid. Samples of duality printing for steams. Model Company, Manchester, Iowa.

WE print shything. Circulars, stationers, stationers. Commercial Press, Ba-

PRINTING Outfits—Presses, type supplies, One morellies Scoul stamp for catalogue, Model Press, Tork, Points.

250 LETTERHEADS, 250 white envelopes, printed and mailed, \$3.10. Samples printing free. Address Senso, Mohauk, N. Y.

PRE-USED Printing Presses. Type and supplies. List for stamp. Popular Bargains, Richland, Pa.

#### RAZORS AND BLADES

DON'T destroy bludes. "Bladekulfe" most useful invention ever; installful packet tovolly; delights whole family: Sec. Martin, less 1615. Paterson, N. J.

MLADES restorpened, 3e; any make, Guirranteed service, Standard Safety Razer Corporation, Philippengh, Pa.

BLADES reshorpened. Work guaranteed. Double edge, Sc. single, Sc. Triggs Co., Orderville, Mass.

YEST Pucket Cities Blade Sharpener. Easily operated. Fifty eems postpath! Sutlafaction or manny back, Specially Shop, 427 10th Bt. N. W., Washington, D. C.

BLADES, reshorpetted, she edge fire deci-

#### FOR SMOKERS

PURE Red Leaf Totsteen, quality guaranteed. Been cheering, 4 Ho. 31.25, 10 Ho. 38,10, Mild smulting, 4 Ho. 21.25, 10 Ho. 38,10, Mild smulting, 4 Ho. 21.00, 10 Ho. 32.10, delivered. 0. D. Collier, Agent. Martin, Tenn. "Collier is absolutely between and reliquie," Martin Bank, Barmer. \$2.10. deliv tin, Tenn. and relia! Cashier.

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16' ROWBOAT casily made. Construc-tion blueprint, 3Dc. Wee-Sho-U Ca., West Market, Detroit, Mich.

"HOW to make your bout leakproof," Send for booklets, L. W. Ferelmand & Co., 152 Kneeland St., Boston, Mass.

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MAUSER, Luger, Manuficher Acres, Catnieg, ten cenus in stamps. Pacific Arms Corporation, San Francisco, Cal.

LOWEST prices in America. Bevolvers and gutomatics. All standard American and foreign makes. Big Blustrated price list free. dielger's, 848-845 Broad St., New-ark, N. J.

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SEND 5c for my best flat, coins, Indian relics, antique flavorus. F. E. Ellis, Webster Groves, Ma.

FOR Dens-Relies Collected from Eu-trope's Battlefields. Catalogue and War Photography 10c, Will also buy relies. Licux. Welsh, 2117 Regent Place, Brook-lyn, N. Y.

GENUINE Indian Baskets and Wasapiint-Wholesale catalog, Gilham, Kelseyville, Cal.

#### FOR THE HOME

HOME Builder's Guide plan book, \$1, postpold, 1, 0, Bjostod, Architect, Pallado Bidg., Duluti, Mint.

OH, periffits of yourself or stear one) Strikingly beautiful and wonderfully life-like. Nothing like their appelere! Agents, Samples free, any photo, Brack Studio, 210 North Sth. Philadelphia, Pa.

<sup>2</sup> AND 5 ply Veneer, immediate delivery, Durm And Damer, Canal at Russevelt, Chi-

MARE Inexpensive lecters Refrigerator. Bitteprint Sic. William Quenore, Cara-don, New Jersey.

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WEAR Boulde Scile Socies, Positively Darupenof, Black or associad colors, True sizes, 9½ in 11½. Dozen pairs guaranteed one sent. \$3,00, postpaid. Harry C. Scitzer, Dopt. PM, Reading, Pa.

MEX, low your hots direct from factory, and for catalogue. Model Hat Mfg, Co., Send for catalogue. East Orange, N. J.

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POCKET Telescope—of real med4—for \$2.10, prepaid. Magnifies 4% times. Ralph J. Golsen, 1128 Argide St., Chicago.

ARTEFICIAL Eyes, Special Selections of finest make, beform eyes with blinded Iris, Direct by shall at Fre-war Priors, Perfect fit guaranteed. Only Balcom, O. D., Shelby, O,

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BEAUTIFUL Turkish Lucky Stones, One Dullar. Bed stone brings list California preclous stones. Obl. and Young King Brady Gem Co., 5013 South San Pedra St., Los Angeles, Calif.

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2008T quality phonograph parts, assuring finest results at big saving. Catalogue for stamp. Superior Phonographs Co., Eric, Pa.

HUILD a genuina Cheralcon phonograph, and vacy over half. Big profit building and selling. We furnish hubers, tone-arms, full historichus and all necessary parts. Seel for calalog and free bhispriet offer, Cheralcon Phonograph, Co., 322 11th St., Elkhart, Ind.

GOMESTEEL Talking Machine Needles play many times without charming. Tone unexcelled. Eight for 25 cents. Lewis, Mfr., 220 North Futirth, Reading, Pa.

AMERICAN phonograph puris are best and lowest priced. Write for catalog to-day. American Phonograph Co., 3513 North Crawford, Chicago.

SAYE records and money. S Nordle advertisement, page 143,

BUILD your phenograph. Quality Phono-purts, Highest quality spring and electric birdors. Tone Arms. Reproducers, Amplifiers, Case Material and Americans. Prev Blue Prints and Building Instructions. His sar-iest. Wonderful results. New catalog tradicts for fen cents. Hossier Manufacturing & Sarady Co., Phonograph Supply Department, 313 Haidwin Block, Imiliampolin, Ind.

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"MUSIC Composed" to words, Barrey Brus (formerly of Souss's Band), Oshkosh, Wis.

COBNETISTS — Trembonists — Sanophon-ists — Clarinetists. Send for "Free Pointers." Name instrument, Virtueso School. Buffato, New York.

WHITE Songs. Big money and renuration.
Write for information. J. Gerden Pub. Co.,
201 N. Horne Ave., Chicago.

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## The Woman Who Wished She Could Play the Piano

## And How She Found an Easy Way to Turn Her Wish Into a Fact

A YEAR or so ago this woman didn't know one note from another. Today she plays the plano—entirety by note—better than many who have been playing for years. Here she tells how she learned and why it was so easy. Thousands of others, from school children to men and women of 50 to 60, luve also learned music in the same easy way.

ROM the time I was a child I have always had a yearning and longing to play the piano.

Often I felt that I would gladly give up half of my life of some kind fairy would only turn my wish into a fact. You see, I had begun to think I was too old to learn, that only

You see, I had begun to think I was too old to learn, that only some sort of fairy-story magic could give me the ability to play. I was 35 years old—and the mother of a small family—before I know one note from another.

'Until I learned to play, hearing music—especially the piano—always gave me almost as much pain as pleasure. My enjoyment of it was always somewhat soured by cavy and regret—envy of those who could entertain and charm with their playing, regret because I myself had to be a mere listener. And I suppose it is that way with everyone who has to ome be satisfied with hearing music instead of playing it. Again and again, parties and other social gatherings there been all but spoited for me. I could enjoy myself until some one suggested music or singing; then I felt wom instead of part of the party. I was missing half of the fun.

the fun.

The way I have suddenly blossomed out in music (almost overnight, you might say) has been a big surprise

(almost overnight, you might say) has be to all who know me, and to myself as well. My friends seem to think it must be that I had a previously undiscovered genius for the piane. But if there was any genius about it, it wasn't on my part, but in the lessons I took—a new and simplified method that makes it remarkably easy for any one to add music or sturing to their one to add music or singing to their

that makes it remarkably easy for any one to add music or singing to their daily lives.

I learned entirely by home study—in my spare time—from fascinating Print-and-Picture lessons that make everything so simple and easy that one simply can't go wrong on them. I call it a short-cut way to learn—it is so much simpler and so entirely different from the old and hard-to-understand methods. I know that I made better and faster progress than I ever could by bothering with a private teacher or joining a class. In fact, while I don't like to brag, within aix months after I took my first lesson, my playing was better than that of many of my friends who had studied two or three years under private teachers—not because I was any more apt than they, but simply because the wonderful Print-and-Picture lessons sent ine by the U. S. School of Music were so easy to understand.

Within a year after I took my first lesson. I began teaching my two little girls to play—using exactly the same lessons I myself had studied. And I noticed that both of them seemed to be getting along better than any of their playmates who have private teachers. In addition, I am saving the money it would cost to have a private teacher—I figure it would cost at least \$1 to \$1 a lesson to have a teacher whose instruction could compare with that contained in the printed lessons from the U. S. School. Yef, from the first lesson to the last, the total cost of learning the way I did averaged only a few cents a lesson.

My only regret is that I didn't know of this really won-

a lesson.

My only regret is that I didn't know of this really won.

The ability to play is such derful method years before. The ability to play is such a great comfort. No matter how much I am alone, I never get lonesome—I can always turn to my piano for amusement. I am never at a loss for a way to entertain callers. I no longer feel that I am "out of it" at



social gatherings. Do you wonder that I so gladly recommend the method that has brought me so much pleasure and satisfaction?

pleasure and satisfaction?

This woman's experience is by no means unusual. Over 30,000 others—from school children to men and women of 50 and 60—have learned to play their favorite instrument, or learned to sing in the same way this woman did. Largely through the recommendations of satisfied pupils, we have built up the largest school of music in the world.

Whether for beginners or advanced pupils, our method is a revolutionary improvement of the old and hard-to-learn methods used by private teachers, and our method is as

old and hard-to-learn methods used by private teachers, and our method is as thorough as it is simple and easy. We teach you in the only right way—teach you to play or sing entirely by note. No "trick" music, no "numbers," no makeshifts of any kind. Yet it is a short-cut method, simply because every step is made so simple and clear. The total cost averages only a few cents a lesson, with your music and everything included,

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When learning to play or sing is so easy, why continue to confine your enjoyment of the music to mere listening? Why not at least let us send you our free book. Just now we are making a special short-time offer that ents the cost per lesson in two—send your name and address in a letter or on a post card. Please write name and address very plainly so that there will be no difficulty about booklet reaching you. Instruments supplied when needed, cash or credit,

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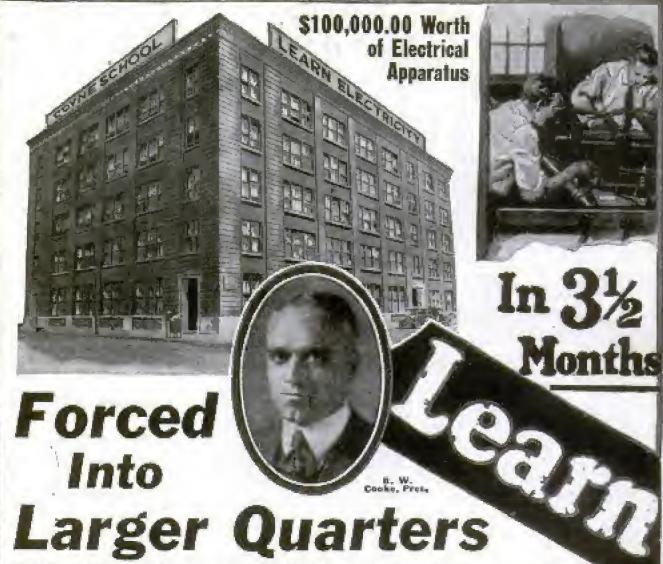
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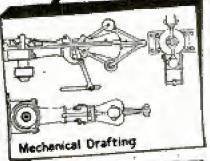
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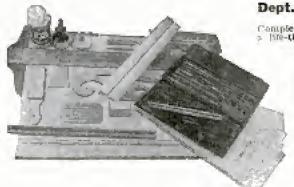
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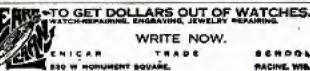
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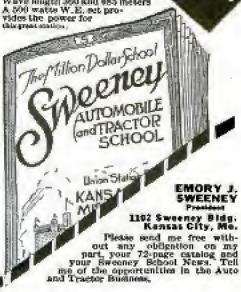
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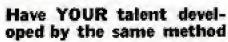
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#### Only One Road to Success

Yes indeed, there is only one road that leads to success, and that is the mental road. If you expect to accomplish anything worth while by any other method than the development and use of your mental faculties, you are simply deceiving yourself. And the biggest fool in the world is the man who fools himself.

Isn't it simply absurd, when you stop to think about it, that most people are striving for success and yet are doing absolutely nothing to strengthen and develop their minds, which is the only part of them with which they can ever hope to win success?

The principal reason that the trained thinker gets ahead is because he has so little competition.

The unthinking toiler works hard for small pay because almost anyone can do his work.

What are you doing-as the days go by-todevelop your mind? Are you more efficient mentally than you were a month ago-or a year ago?

#### Missing Success by a Hair's Breadth

The difference between success and failure is often but the breadth of a hair.

The man who is making twice as much as you are, has nowhere near twice the intellectual ability. The man who enjoys an income of \$10,000 a year is not five times

come of \$10,000 a year is not now times the mental superior of the man who receives only \$2,000.

Probably the man who makes \$1,000 a month is only 10% to 20% better trained mentally than the man who is trying to make both ends meet on \$100 a month. This is a fact. And it should be a most encouraging fact to every man who wants to be somebody and man who wants to be somebody and

man who wants to be somebody and pet somewhere.

Improve your mental power only 10% and you will multiply your earning capacity by at least 100%.

#### Get This New Book

We have just published a new book—
The Secret of Mental Percer. We will
gladly send you a copy free of charge
upon request. And we want to state—
as forcibly as we know how—that you
will find it one of the most interesting
and mind-spurring books you ever read.
Send for a copy today. It tells about
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the most practical, common sense sys-tent of constructive thinking - the easiest and quickest method of mind-building ever dis-

covered—the secret of developing mental power in a way that is as fascinating as a game.

Now Is the Time

Send for The Secret of Mental Power now. Do not delay. Do not put it off. Tomorrow you may forget all about it. And the loss will be yours, not ours. For alabout it. And the loss will be yours, not ours. For although we have printed an edition of 20,000 copies, we do not expect to have a single one left at the end of thirty days. They are going—and going fast. Therefore act at once, for as Sophoeles so truly said, "Heaven never helps the man who will not oct."

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## THE SCIENTIFICALLY BUILT WATCH



Model 1102

# Hammered by Myriad blows

AND yet it keeps dependable and accurate time. The Waltham Automobile Clock is in use wherever cars run over American roads. It is hammered in each car by thousands of blows every year (the roughness of the road treats it rough) — but it goes on telling the time as if it were reposing on velvet.

This same immunity to shocks and vibrations is also built into every Waltham Watch and is one of the reasons why Waltham Watches keep accurate time under the most difficult conditions.

The genius in the Waltham Watch is the genius in the Waltham Auto Clock and Speedometer. A trinity of usefulness, dependability and truth-telling.

The Waltham Speedometer also excels. Invented by Nikola Tesla but developed and perfected by Waltham, it is the only Air-Friction Speedometer in the world. It tells speed and mileage instantaneously and accurately.

The World's leading cars are equipped with Waltham Speedometers and Clocks. And men and women who invest their money wisely wear Waltham Watches.

WALTHAM WATCH COMPANY WALTHAM, MASS.

Service Stations in all leading cities



Waltham Colonial 1420 15 Jewels \$45 — \$75 Depending upon the case

## WALTHAM

THE WORLD'S WATCH OVER TIME

Where you see this sign they sell Waltham Watches GIFTS THAT LAST

## Popular Mechanics Magazine

nedisferen in U. c. parent office

WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 38

SEPTEMBER, 1922

No. 3

## "Human Gopher" Recovers Master Bushing 163 | from Deep Oil Well BY FRED A. HERR, 333 Loud June 18

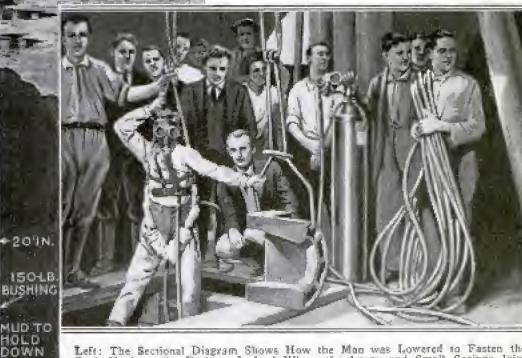
WHEN the Interstate Oil Company of Los Angeles lost a master rotary bushing down the casing of Jonah No. I well in the Signal Hill oil field, three alternatives were available for continuing operations at the well. The lost tool could be dynamited out of the casing, the rig could be "skidded" over a few feet and a new well started—or a man could Co be let down the hole to bring up the

bushing.

Dynamiting involved the virtual destruction of the well, and skidding the rig meant the sacrifice of approximately \$25,000 spent in drilling the hole to its present depth. Then some one mentioned the name of Walter McCay, of Taft, Calif. McCay is known as the "human gopher" in the west coast fields. He was brought to Los Angeles, examined the well, and agreed to go down the hole and bring up the lost tool.

The bushing had lodged at the 110-ioot level in the 20-inch casing. Below it for 1,200 feet to the botton of the hole the well was filled with mud, pumped in to counteract the heavy gas pressure. Sinister bubbles on the surface of the mud indicated the presence of much gas, making the attempt to enter the well a hazard-





Left: The Sectional Diagram Shows How the Man was Lowered to Fasten the Grab Hook to the Bushing Lodged Where the Large and Small Casings Join, Right: Walter McCay in a Special Ruse Harness and Equipped with Oxygen Breathing Apparatus as He Appeared after the Recovery of the Bushing

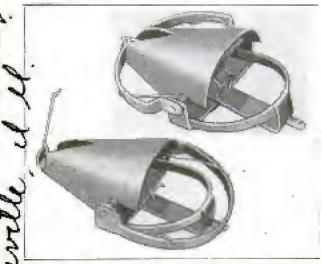
ous undertaking. It was McCay's pleasant job to get down the narrow 20-inch pipe and attempt to "hook" onto the bushing with a pair of iron tongs.

A harness, constructed of 1-inch hemp rope with loops for the insertion of the legs, was prepared to suspend him in the gas-filled hole. The sides of the harness were padded with cotton. The man sat suspended in the loops in the manner of an aerial performer sitting in the iron-rings of a trapeze. Wearing a gas mask, attached by a rubber hose, 150 feet long,

to an oxygen tank, and carrying a flashlight, the man was suspended from the
cat-reel line over the cavernous well
opening and lowered slowly into the narrow, muddy, gas-filled pipe. Oxygen was
continuously pumped down to him. Six
trips were made down the casing before
a satisfactory connection was made with
the tongs. Finally the bushing was
"hooked," and the human gopher was
drawn out of the well, pulling the bushing
up after him. He spent more than 45
minutes in the bole.

## TRAP CATCHES FUR-BEARING ANIMALS HUMANELY

To take the place of the steel-jawed leg trap, the cruelest means of catching fur-bearing animals on account of the



Frap for Catching Fur-Bearing Animals Humanely: The Upper Jaw Swings Over Rapidly When the Bait is Touched by the Animal, and Breske Its Neck

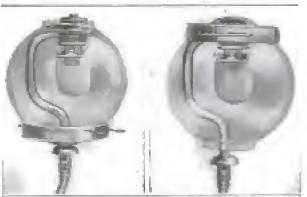
length of time that may elapse before death, a trap has been invented that breaks the neck of the animal, killing it instantly. The trap is composed of two jaws, one stationary and the other movable. The stationary jaw is connected rigidly to the horizontal framework of the trap, and is raised slightly above the ground in front of the hooks that hold the bait. Outside this jaw, pivoted on a spindle on which is a strong coiled spring that operates it, is the movable jaw. When set, this jaw is swung clear back to the rear of the trap, where it is held by a trigger. When the bait is touched by the nose of an animal the jaw is instantly released, and the spring swings it over so that the animal's neck is clamped between the two jaws and broken. It is claimed by the makers that a 10-year-old boy can easily set the strongest trap.

#### HIGH-CARBON GRINDING BALLS GIVE GOOD SERVICE

The grinding balls used in tube and ball mills are subject to most severe conditions of abrasion and shock and must be especially made in order to render good service. It has been found that grinding balls made of an alloyed steel base white iron of high-carbon contending excellent results. These balls are cast in such a way that the crystals radiate from the center of the ball, reducing wear and breakagents a minimum or

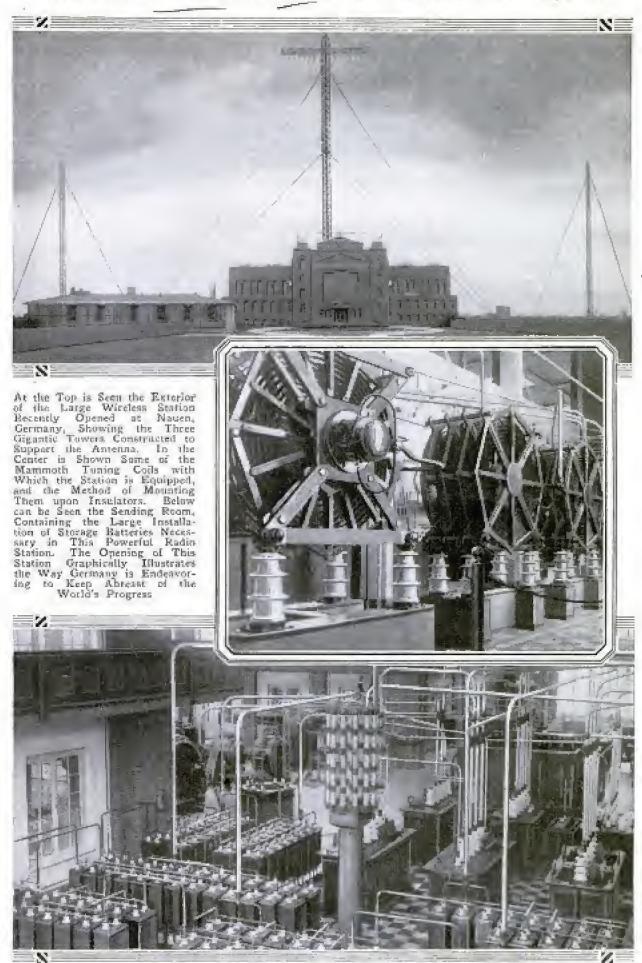
NEW CONVERTIBLE FIXTURE 6/10/2

For converting the open-flame gas burner to the mantle-type of burner, there is now being placed on the market a fixture that has several interesting points. The fixture may be screwed on in place of the open-flame burner, and the "gooseneck" is of such dimensions that it will fit inside the standard shades or globes. The shade holder may be placed at the top or bottom of the globe adapting the fixture for either direct or indirect lighting, a threaded knob being provided at the top of the fixture for supporting the holder.



Left: Burner and Shade Holder Arranged for Indirect Lighting. Right: Same Fixture Used for Direct Lighting Lighting Co. St. Charles Hotel on the State of Charles Hotel on the Ch

## 9743 GIGANTIC RADIO STATION OPENED IN GERMANY



duternational 2012 newsreel Capyrh City d no. J. Is. allew. Carshalton Victoria II. 1111 or of allen. Liver Sarrey Ingland. London, EW WATER-LIFTING MACHINE SELF-OPERATING Eng.



333

Automatic Water-Lifting Machine: From Bottom Up, the First and Second Tanks Are the Operating Chamber and Headrace, Respectively; the Third and Fifth are Closed, and the Fourth Open. The Open Lower End of U-Pipe at the Left Is the Tailrace

A machine that is entirely self-operating, and that lifts water in any quantity to any desired height, has been installed on the river Wandle, England. operate the machine there must be an available fall in the river between an upper level, which may be called the headrace, and a lower level or tailrace. Halfway between is a closed tank which is the operating chamber of the apparatus, and which is connected by an inlet pipe to the headrace, and to the tailrace by a discharge pipe in the nature of a siphon. Above this operating chamber are a series of alternately open and closed tanks, one above the other, at equal distances, to the required height. Each pair of closed and open tanks are interconnected by pipes, and each closed tank is connected by an air-conducting pipe to the operating chamber below. In operation, first by means of an automatic valve the water from the headrace is admitted to the operating chamber, which at that time is full of air. The filling of this chamber with water under pressure forces the air, also under pressure, into the overhead closed tanks, which at that time are full of water. This, therefore, in each case is forced into the open tank above it. The valve then cuts off the water supply to the operating chamber. and its contents are discharged to the tailrace, leaving a vacuum in the cham-This vacuum is communicated by the air pipe to each of the closed tanks, and thus the water in each open tank, filled by the previous stroke, is sucked up to the closed tank immediately above The machine is now in the same condition as before the first stroke, and each of these strokes—one a pressure and the other a suction stroke—is alternately repeated by the operation of the automatic

SILO MOVED FROM ONE FARM TO ANOTHER ON A WAGON

Recently a silo of 3-ton capacity was moved intact from one farm to another in Ohio, and was refrected on a new foundation without injuring it in any way. At its original location, the silo was loaded onto a lumber wagon, and was then hauled to its new site. Here the rear wheels of the wagon were removed, and the bottom of the silo was placed against the side of the new foundation. Then, by means of a block and tackle connected to its top, the silo was



Insert Shows the Silo being Moved along the Road. The Other Views Give a Clear Idea of the Means Used to Erect and Place It in Its New Location

hoisted from the iront wheels into an upright position, and properly adjusted upon the foundation. It was a matter of only one morning's work to remove the silo, and erect it ready for use in its new position. The method was found to result in a considerable saving, but is advisable only when the silo is in good condition.

¶To aid the retail lumber dealers, the National Lumber Manufacturers Association has started a correspondence course on "Lumber and Its Uses and the Merchandising of Lumber,"

#### SPEEDY FRENCH HYDROGLIDER LOOKS LIKE A GIANT FISH

With a speed of 63 miles an hour, claimed to be the world's record, a new French hydroglider has much the appearance of a giant fish. Its air propeller is driven by a 300-horsepower motor that is supported and strongly braced above the craft at about its center and just behind the small compartment in which the passengers ride. It glides on horizontal planes, and is steered and controlled like a flying boat, which in other respects it very much resembles.



New French Hydroglider That Has a Speed of 63 Miles an Hour: The Motor, Directly Connected to the Air Propeller, Develops 300 Horsepower. In Every Respect It is Built Very Much on the Lines of a Flying Boat

chiternational newsreel Orgs

d nomines & I le Wood, Philadelphi LIGHT SPEAKS! Philadelphi LIGHT SPEAKS! Pa.

Little Selenium Cell Provides Voice for Motion Pictures—Old
Inventor Pioneers in New Field—Vast Possibilities
for Research Opened Up by Perfected Coil

BY H. A. LANE

NATURE seems to have decreed that stupendous results in scientific research shall always emanate from the most meager beginnings. Also, that long struggles shall have been put forth before

she consents to relinquish any of her secrets. Any inventor will testify to this from the facts of his own experiences. Many of these inventors or experimenters have

been interested for some time in the wonderful properties of sclenium,

This substance, belonging to the sulphur family, displays peculiar characteristics when exposed to light rays of changing intensities. Due to its mysterious nature, selenium has been made the basis of extensive experiments in the electrical field. Coils of wire, when treated with a compound of selenium and connected in an electrical circuit, can have their resistance raised or lowered by exposing the treated portion of the coil to light. From this basic principle, numerous adaptations of this astonishing

material have arisen. Chief among these, in the past few years, has been the attempt to obtain a synchronous rendition of sound and motion which would be applicable in the motion-picture field.

One of the pioneers of this talking-movie idea is a Chicago man who, some six or eight years ago, began to experiment along this line. Carefully reviewing such possibilities as were commonly known

at that time, the experimenter concluded that, to achieve results, a selenium coil, or cell, was a necessity. Casting about for one of these, he learned that no satisfactory cells were available. Refusing to be halted by the circumstances, he hunted up an old friend, L. A. Brinkman, also of Chicago, who had tinkered with numerous small inventions for the greater part of

his life. Uncerest moniously the worried man burst upon the old 40 ventor one day a bruptly polytoper to me a selenium was a s

Nevertheless, Brinkman, in his peculiar way, strove to oblige his lifetime friend and immediately began to work or his new problem. Pamphlets from various universities and advice from scientific sources caused him to try elaborate mixing and haking methods in order to produce the proper compound for creating a satisfactory cell. But after many months of unsuccessful trials, he impatiently brushed aside all the proffered formulas, and acting under a sudden

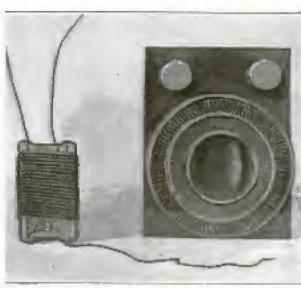
impulse, mixed a compound of his own. Then, taking a tiny coil of wire, he spread, or to quote his term, "smeared" the mixture over the surface. Placing the coil in an electrical circuit, he was astonished to observe the extreme sensitiveness of the midget cell when light of varying intensity was directed upon it.

By the time Brinkman had succeeded in producing a satisfactory selenium cell, his friend

had been obliged, through financial obstacles, to put aside his talking movies, and the old genius promptly lost interest in his discovery. Vague accounts of the



Miniature Lamp (Exact Size) Which Aids in Changing Sound Waves to Light Waves When Voice Variations in the Transmitter Vibrate the Filament



Left: One of the Wonderfully Sensitive Selenium Cells, Showing, in Actual Size, the Winding of Copper Wire upon a Soapstone Core. Right: Selenium Cell Inclosed in Its Case

9810



Tuning the Radio Amplification Apparatus to Obtain a Reproduction of the Tones of the Human Voice from a Strip of Motion-Picture Film: This Picture, Taken during the Development of the Talking-Movie Idea, Shows the Inventor behind the Table, being Assisted by His Friend

cell found their way into print, and though it was known that he had produced the article, no one seemed to have a use for it. This was the state of things up to the latter part of last year. At that time another man was searching the

country for a selenium cell to aid in the work of photographing the sound waves of the human voice. Finally, through devious channels, he was directed to Brinkman, and requested by mail one of the tiny treated coils for experimental purposes. The inventor obligingly presented him with one, and he quickly realized the possibilities of the amazing sensitive-to-light qualities of the small cell.

In six months' time, they had reached the stage of comparative success. The underlying principle of their labor was to change the

sound waves, or vibrations of the human voice, into light waves, and then obtain a photograph, or record, of these light waves upon a strip of ordinary motionpicture film. Then the light waves, which appear on the film as fine lines of different shadings, were to be detected, or "taken off," amplified by radio apparatus, and the voice thereby reproduced in its

natural tones.

In brief, their method of procedure is as follows: The vibrations of the voice are carried into a telephone transmitter and from there, as electrical impulses, they pass through a miniature lamp connected in a battery circuit. The variations of the sound waves change the impulses in the battery circuit, and cause a vibration of the tiny light. These vibrations, invisible to the naked eve, are recorded through a narrow slit which permits the light to fall upon the swiftly moving film. The film is then developed in the usual manner, the



Close-Up of Reproducing Mechanism, Showing How the Film Passes between the Light and the Selenium Cell

vibrations appearing, as stated above, as lines of different shadings. For reproduction, the film is passed between a

### POPULAR MECHANICS

selenium cell and a bright light. The lines or shadings on the film cause a change in intensity of the light which is shining through them and on the selenium cell, thus causing a change in resistance of the sensitive coil when it is connected in an electrical circuit. From this point, by proper radio-amplification methods, these variations in the electrical circuit are transformed into sounds, which are the exact duplicates of those carried into the transmitter at the beginning of the operation.

By being able to record the voice at the same time the pictures are filmed, on the

Portable Outfit for Obtaining a Record of the Voice at the Same Time the Pictures are Taken: The Crank for Turning the Reels, and the Transmitter, are Seen in Front

margin of the same strip of film, and with the developing process being exactly the same, the absolute synchronism of the sound and action is clearly apparent. And when the film is eventually projected on the screen, there is no possible chance for the voice and action to get "out of step," which fault has been the stumbling block of all other systems of this kind, heretofore.

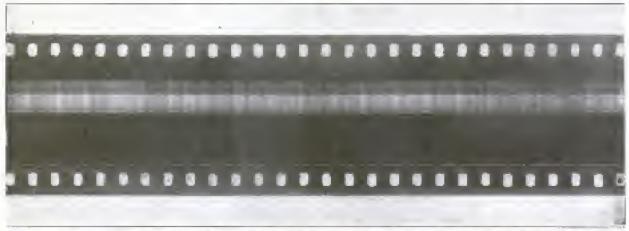
Taking into consideration the fact that sound waves, which travel at the approximate speed of only 1,100 feet per second, can be changed into light waves having a velocity of 186,000 miles a second, the possibilities of the tiny sclenium cell are inconceivable. This fundamental fact alone opens broad fields of theory. The three men responsible for the bringing forth of the marvelous discovery, how-

ever, are concentrating upon the talking motion picture.

Other uses to which the innovation can be put, are the making of films, or records, of entire operas, and symphony concerts. These will be recognized as being greatly superior to the four or five-minute records now available on the common talking machine. In addition, the metallic, or "tinny," sound will be entirely eliminated, owing to the absence of any mechanical contact between the record and the reproducing mechanism.

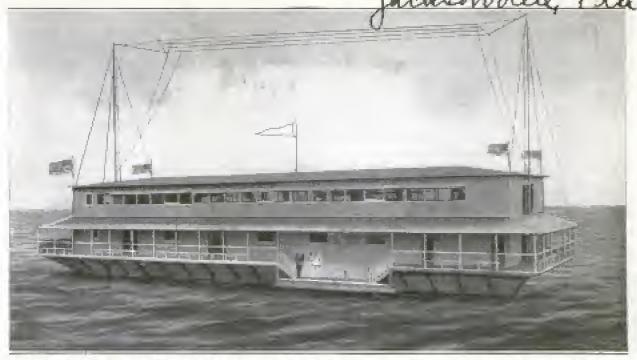
Further adaptations based upon the merits of the selenium cell are: fire alarms, by giving notice of the glare of flames; burglar alarms, by indicating the presence of flashlight beams; the measurement of light intensities; the testing of materials or substances by colors; the recording

of entire court proceedings without error, and the switching on and off of lights in isolated places by the automatic action of daybreak and nightfall upon the supersensitive little cell.



Section of Motion-Picture Film Used during the Early Experiments, Which Shows, by Means of the Shaded Lines, How the Record of the Human Voice Appears on the Finished, or Developed, Surface

P. E. Peck, Pecks Harring Pankino



Floating Dance Pavilion Which is Anchored but a Short Distance from Jacksonville, Florida, and is Used 9736

### FLOATING DANCE PAVILION AND PALM GARDEN

Anchored in the beautiful St. Johns River, a short distance from the city piers, a floating restaurant and dancing pavilion is the novel pleasure resort for the people of Jacksonville, Fla, A large barge was used as a foundation for the pavilion, which is built to accommodate 1,500 persons. The dance floor, on the main deck, is probably the most popular feature of the boat. An orchestra stand is in the center of the floor, while at one end are found check rooms and rest parlors for guests.

Double stairways lead from the main to the upper deck, which is devoted to a palm garden, attractively decorated and furnished, where is served sea food fresh from the Atlantic. Loud-speaking radio-receiving sets are also installed on this deck. Numerous small launches run from the pavilion to the shore dock at frequent intervals. The venture is proving successful.

#### COLLAPSIBLE VIOLONCELLO PORTABLE AND QUIET

As portable as a violin is a knockdown violoncello invented by a woman musician in Paris, France. The instrument has a skeleton body so constructed that it is sufficiently mute to be heard only in the room where it is played. Thus it can be carried about, giving the musician the

opportunity of practice, anywhere at any time, without danger of disturbing people in the vicinity. There are three detach-



Violoncello Shown Dismembered at the Left, While at the Right It is Seen in Use

able parts to the instrument, and it is also partly collapsible, so that the whole can be folded together to form a moderate-sized package.

(Shipped from London, England, in 1914, a trunk went astray and journeyed from place to place for eight years, being finally delivered in New York City, its proper destination.

out, giving the musician the proper destination. Clemen chw. Wademorselle Codele France mercury July Co 411 & Haleted

### TRUCK FOR DUMPING PARCELS AT CHICAGO POST OFFICE

For handling postal parcels, a new kind of dump truck is now in use at the Chicago post office. In the projected new terminal post office 8 or 10 of these trucks will be formed into a train bauled by a small electric tractor. The train will carry the parcels to a trough in the floor, where an operator will release the tilt-

belt. It takes only about seven minutes to unload each train, and besides the great saving in time by this method, there will be far less damage to the parcels, as they slide smoothly onto the belt.

### LARGEST TRADE SCHOOL

With the enrollment of more than 130,000 students, the rehabilitation divi-

sion of the United States Veterans' Burgan become the largest trade and industrial school in the world. The students are scattered all over the country and are being trained in the leading colleges, technical and commercial schools, as well as in business establishments, in shops, and on farms. Practically every vocation is represented in the training, and the courses selected for the men are such that their disabilities will not prove a handicap. Contrary to general opinion, only a small percentage of the



New Parcel Dump Truck Now in Use at the Chicago Post Office: The Parcels Slide onto a Conveyor Belt That Operates in a Trough in the Floor in Front of Them

ing device, dumping all the packages in each truck successively onto a conveyor

men receiving vocational training suffer iron amputations. Washington, 10.C

ng. 3800

KENTUCKY BLUE-GRASS SEED IS VALUABLE BY-PRODUCT

BECAUSE of the nature of the famous blue grass of Kentucky, cattle can be raised and fattened on it all during the year, yet, at harvest time, the seed can be harvested and sold at a good profit. Advantage has been taken of this peculiar property, and many large stock farms annually sell thousands of dollars' worth of the seed. There is always a good demand for it for lawns and pasturage, and also for seeding the fairways of golf courses.

World World

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This Aerial Photograph was Taken over the Wilbur Wright Aviation Field and Shows, to the Right, the Town of Pairfield, and below It the New Site for Osborn, Not Yet Laid Out

#### \*TOWN MOVES ITSELF AT A PROFIT

Old Site Menaced by Flood Waters of New Retarding Basin of Big Dam— Unusual Plan Adopted for Moving and Rebuilding at New Location on Higher Ground

BY IVAN E. HOUK, City

N southwestern Ohio there is a small town named Osborn. This village of about a thousand population grew up along the banks of Mad River some 12 miles northeast of Dayton, not far from the scene of the Wright brothers' worldrenowned aviation experiments. to the great flood of March, 1913, Osborn's existence had been comparatively uneventful. Up to that time there had been no unusual circumstance to dis-tinguish it from the several thousand similar villages scattered throughout the United States. Today, however, the situation is different. Its people are now doing something out of the ordinary; they are moving their entire town from its present location in the bottom of the valley to a site on higher ground about two miles away,

There have been instances before where it was necessary to move entire towns. Clinton, Mass., was moved because of the Wachusett Dam. Sulphur, Okla., was moved because of the drainage of the

town wastes into the cineral springs near that place. The moving of Angerican Falls, Ida., in connection with the Snake River development and the construction of the American Falls Dam took place a year or so ago. In no instance, however, so far as can be learned, was the actual moving carried on by the residents themselves as is the case at Osborn.

Osborn is being moved because its original location is within the retarding basin formed by the Huffman Dam, one of the recently completed Dayton flood-prevention dams. Although Osborn did not suffer serious flood damage in 1913, it would have if the dam had been built, since the calculations of the flood-prevention engineers show that in the future the original townsite will be covered with backwater about once in 40 years, and this is enough to prohibit the future existence of the town in such a location, especially when it is considered that the next flood of great enough proportions to flood the place is just as likely to come

#### POPULAR MECHANICS

this year, or next, as 40 years hence. The village was acquired by the flood-control authorities in 1918, about 75 per cent of the property being obtained by direct purchase and the remainder by condemnation. Inasmuch as there was at that time no need for haste in wrecking or otherwise disposing of the structures, owing to the fact that the dam had been barely started, the homes and business houses were rented to their former owners. The intention of the flood-prevention directors was to hold the prop-

erty until they could dispose of it advantageously, either as a whole or piece by piece, with the stipulation, of course, that it beeither wrecked or moved out of the flood zone. It was then the leading men of the village got together and worked out a plan for buying back their town and moving it in its entirety to higher ground — the plan they are executing today.

These men, headed by the mayor and the city attorney, organized the Osborn Removal Company and incorporated it

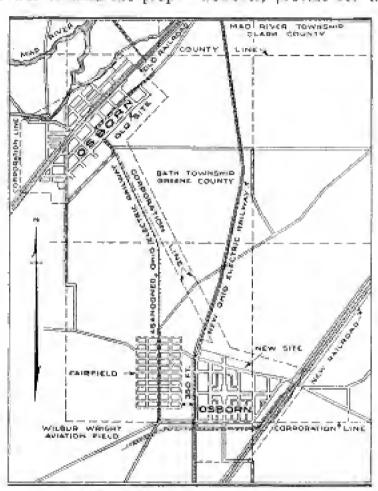
under the laws of Ohio as "a corporation for profit." While the incorporators hope to make a reasonable profit, their real purpose is to preserve the town of Osborn. They assured the people when they formed the company that there would be no profiteering, that the interests of the people would come first and the matter of profit second; and they have adhered to their original intentions.

The company was capitalized at \$100,000, and stock was sold at par to the residents of Osborn. Each block of 10 shares entitles the owner to buy a lot at the new

site. The new site, covering 129 acres, and all of the movable property at the old, were purchased from the flood-prevention authorities at a price which represented a fair valuation for the new land and the actual wrecking value of the property to be moved.

Besides the new site it was necessary to purchase a strip of land running between the two locations. The reason for this was that the Ohio laws provide no method for moving a town. They do, however, provide for the annexation of

contiguous territory and for the separation of unnecessary lands. Consequently the strip of land leading to the new site and the new site itself were annexed by the village council, according to law, and as soon as the moving is completed, the old location will be given up by the same process. It was necessary to comply with the laws in this way in order to retain the original charter, and thus keep possession of the money in the town treasury and in the school fund. If the original charter had



This Map Shows the Old Townsite in the Upper Left Corner, and the New Site Below, with the Strip of Purchased Land Joining the Two. This Purchase Was Necessary in Order to Comply with the Law and Retain the Original Charter of the Town

been surrendered and a new one granted for the new site, this money could not be transferred but would revert to the township.

Having secured the village, the next step was to sell the individual properties back to their former owners. Here was where the sincerity of the removal-company officials was put to the test. They might have sold the properties to the highest bidders, but they did nothing of the kind. They assessed a fair valuation against each property and then offered it to its former owner at that



This Location of the Old Town of Osborn is Menaced by the Backwater Created by the Construction of One of the Dams Built next Dayton as a Flood-Frevention Measure

price. They paid no attention whatever to the people who came along and offered twice the assessed valuation for some other man's house, unless the former owner had advised them that he did not care to buy it and there was no one else who had a personal claim on it. If the former owner did not care to purchase a given house, and there was a renter who had lived in it for some time and become attached to it, the renter was given

the same opportunity to purchase it as was given the former owner. If neither the owner nor the renter cared to purchase, it was offered to anyone who did.

The next step was to sell the lots at the new location. Since there were no personal ties involved in this case, it was decided to sell the lots at auction. The lots were numbered and a minimum price placed on each. The only lots reserved were those to be occupied by the four



The New Location as It Appears Today: A Few New Houses have been Built, and Some have been Moved from the Old Townsite. An Elevator has been Constructed near the Railroad, and Curbs, Sewers, Gos Mains, and Elevator-Light Lines have been Installed

342

churches and by the business houses. The lots in the business block had been platted with special reference to their use, and therefore could not be sold for residential purposes. The churches could be located almost anywhere outside the business block, but it was believed that the people would be better satisfied if they knew before buying their lots where the churches would be built.

Before starting the auction, which was an invitation affair attended only by the stockholders and their immediate relatives, a vote was taken to determine the comparative value of the various lots, each stockholder voting for the lot he preferred. The lot receiving the highest number of votes was then auctioned first. The disappointed parties were then permitted to vote again, a new poll was taken, and the new lot having the highest number of votes sold. This process was continued until the stockholders had all obtained lots, after which the remaining lots were placed on the open market and sold to anyone who desired to purchase.

One of the most noteworthy things connected with the project was the care with which the new town was planned. Generally town plans, if made at all, are made in one generation and carried out in another; but here was a case where a town could be planned and also built, all within a period of one or two years. The incorporators, recognizing the importance of careful town planning as well as the unusual opportunity afforded in this instance, engaged an engineering

firm to lay out the streets, subdivide the blocks into lots, and take general charge of the construction activities. Consequently the new Osborn will be a wellproportioned village, with large lots, playgrounds, and parks.

About 200 houses will be moved, practically all of which are residences. Business houses will not be moved, but will be built new at the new site. The same is true of the schoolhouse and churches. The waterworks system will be moved so far as it is practicable to do so.

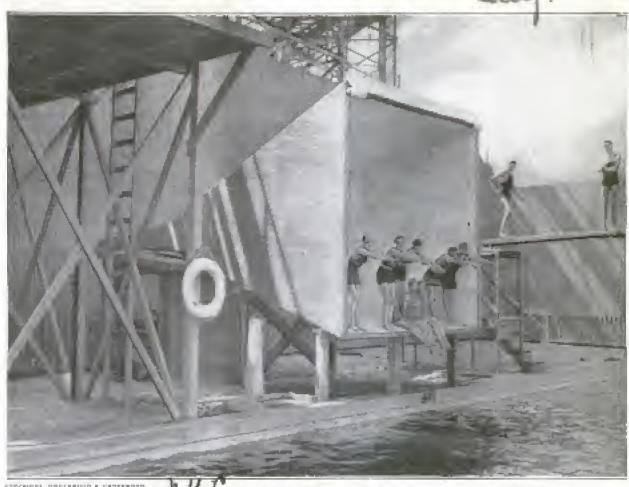
Combined cement curb and gutters, and cement sidewalks will be built soon. An elevator and railroad station have been built at the new railroad location, and trains are now making regular stops.

From the financial standpoint the work is progressing nicely. Contracts have been let for practically all the work yet to be done, so that the officials know where they stand. It now seems certain that the people will get their houses moved to their new locations, all of their lot grading and sidewalks completed, and their houses repainted, repapered, repaired, and refinished in first-class condition at a total expenditure of about 75 per cent of the prices they received from the flobd-prevention authorities. In other words, they will be established in their new locations and will have about 25 per cent of their money left to pay them for the mental anxieties they suffered in being forced to move, which seems very reason-Besides, the stockholders of the removal company will have a fair profit to pay them for their work.



The Huffman Dam, About Five Miles from Dayton, Shown during a Spring Freshet: It is the Backwater from the Dam That Threatens the Town of Osborn at Its Original Location

## que al dora Cart. Clahland POPULAR MECHANICS Carel.

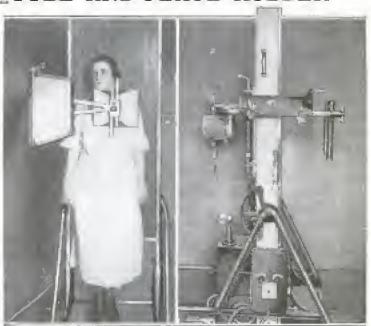


RADIO MEGAPHONE IS LARGE ENOUGH FOR A DIVING PLATFORM

TERMINATING at the edge of the pool, a radio megaphone has been constructed at a California bashing resort, that, for size, eclipses anything of the kind that has been built, up to date. The opening of the megaphone is rectangular, and is so large that it can be used as a diving platform by at least seven persons at one time. The music coming from the loud speaker is of such volume that, on a quiet night, it can be heard for several miles. When radio concerts are not being given, a phonograph may supply the music.

### FRAME FOR X-RAY TUBE AND PLATE HOLDER

In order that an X-ray picture may show the same conditions as disclosed by an examination through a finoroscopic screen, it is necessary that the plate holder should occupy the exact position formerly held by the screen. To insure this condition, a frame has been devised for holding the screen and plate holder interchangeably in a bracket. This bracket and the X-ray tube are supported on an arm in such a way that they are always the same distance apart and in exact line. The bracket holds the screen or plate exactly centered with the X-ray tube. The tube and bracket can be moved together along the supporting arm to accommodate fat. or thin persons, the focus always remaining the same.



Left: The Fluorescopic Screen and Photographic Plate-Holder Bracket in Use. Right: The X-Ray Tube and Bracket are Adjusted by a Rack and Photon

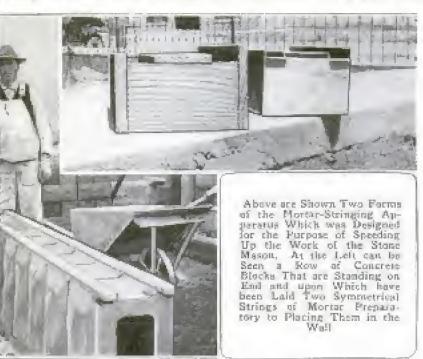
Roentgen

appliance Co San Francisco cont E. F. Lange, Brownell Bldg POPULAR MECHANICS

#### NOVEL METHOD OF STRINGING MORTAR IN MASONRY WORK

In erecting walls of concrete or hollow clay blocks, instead of stringing the mortar by hand with a trowel in the usual

amer amounder, hely



way, a builder in Nebraska makes use of a device for stringing the mortar on the top and the ends of each block before placing it in position on the wall. With this device any unskilled laborer, it is claimed, can lay a string of mortar on a block as rapidly as it could be done with trowels by three skilled masons, and with such evenness that very little trimming is necessary.

#### UNITED STATES AND EUROPE TO EXCHANGE CIVIC DATA

To facilitate exchange of data with an international association of cities interested in civic improvement, and similar matters, a new bureau has been created by the Department of Commerce, bureau in cooperation with the Library of Congress, will collect and arrange American data to be contributed to the international association, called "l'Union Internationale des Villes." In return the United States is to receive valuable information from Europe and other civilized lands. The headquarters of the organization is at Brussels, Belgium, and members pay a small fee for the support of the central office there. Great expense will thus be saved by eliminating local investigation committees,

The american City april 1922

IN ALCOHOL AS FUEL Alcohol as a motor fuel has recently

been made the subject of extensive tests by a British commission to determine its

HIGH THERMAL EFFICIENCY

value, and interesting facts have been estabinteresting lished by the experimenters. Some of these are, that the thermal efficiency obtainable is higher than with petrol or benzol; that there is no evidence whatever of corrosion in the engines; that the power output is increased by the low temperature of the circulating water; that supplying heat to the carburetor reduces the power output, but at the same time slightly increases the thermal efficiency, and that under all conditions of mixture or throttle, alcohol requires a more advanced spark than is the case with gasoline or benzol.

A further series of experiments is being carried on at the present time with a view to determining the effect of alcohol when used in conjunction with gaso? henzol, and other motor fuels.

Christian & cience monte ATTRACTIVE BUNGALOWS MADE TO HOUSE BEE FAMILIES

Attractive\_beehives, modeled after bungalows, have been built by an apiarist of Sioux City, Ia. A porch, a front door,

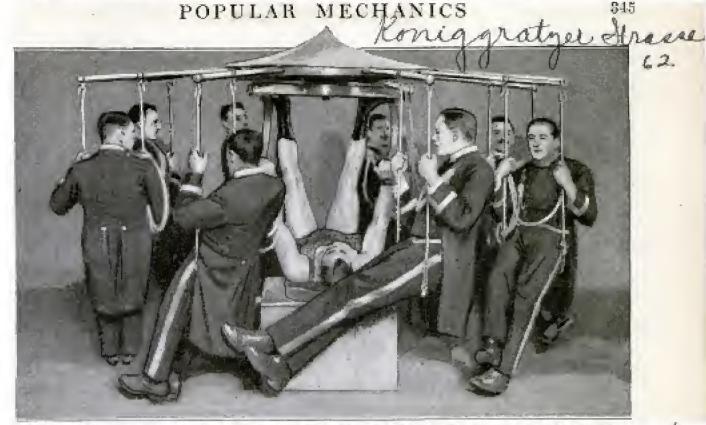


Two of the Attractive-Appearing Beehives Which have been Constructed to Represent Tiny Bungalows

and several windows help make the small houses faithful miniatures of human dwellings, in addition to which the tiny structures are carefully painted,

o material

9698 attantie Bhoto Co., Berlin, & W. 11.



This Strong Man in a German Circus Supports on His Extended Legs the Framework of a Merry-Go-Round upon Which Eight Pull-Grown Men Ride

#### STRONG MAN SUPPORTS EIGHT 9697 MEN AND FRAMEWORK

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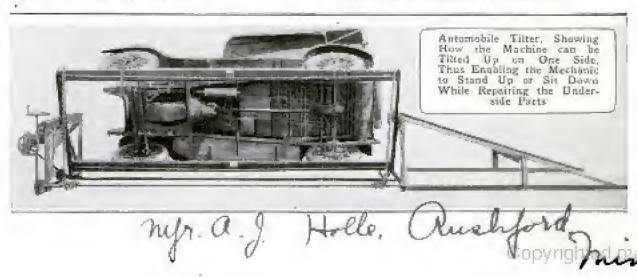
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In an effort to excel in their chosen profession, performers are constantly devising new ways of showing their skill or strength. As an example of this nature, a circus performer of Berlin makes himself the center support of a merry-go-round on which eight full-grown men ride. The strong man lies on his back on a raised pedestal and supports the frame on his feet.

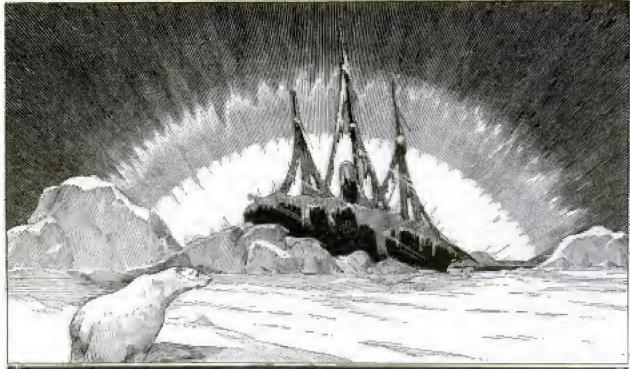
(Built in honor of seamen who lost their lives in the World War, a memorial tower, standing 180 feet above the water at Victoria Pier, Montreal, Canada, has recently been completed. It comprises a clock and signal tower for harbor use, and is electrically operated.

### TILTER FOR AUTO REPAIRING GREAT AID TO WORKER

5 5 Automobile repairing has been facilitated by the introduction of a tilter which does just what its name impliestilts the car over on one side, exposing the bottom-thus greatly aiding the repairman. With the use of this outfit, the workman can stand upright, or sit down comfortably in the open air, and work naturally to the best advantage. This method will be quickly recognized as being far superior to the old way of lying on one's back, or crawling into a dirty pit beneath the machine. The apparatus will lock at any angle without strain to the car, and the raising or lowering mechanism can be operated easily by one man. The outfit is 2 feet high and about 8 feet longer than the usual car.



9381 Cml. 7. W. Froble, 5-2! Twelfth am Season Was



### PHANTOM SHIPS of the ARCTIC

Sighting of Old Side-Wheeler Revives Story of Polar Mystery Fleet — Other Lost Ships may have Drifted North — Find "Teddy Bear" Safe

By STRATFORD F. CORBETT

EVERY winter deserted ice-locked ships are seen in the mists of the polar seas, drifting at the mercy of wind and current, their broken masts and crumbling rigging hung with ghostlike icicles, and their decks and cabins buried in drifts of snow. At least, so run the stories of Eskimo narrators.

A' Russian side-wheeler, the "Polotof-ski," built 70 years ago, is the latest addition to this "phantom fleet." She was discovered, toward evening, by a party of Eskimos hunting walrus. Plans were made to board her next morning, but during the night the changing wind swept the ship far north into the unexplored wastes.

The "Polotofski," according to the only accounts available, was caught in the ice at St. Michael, in December, 1915, and disappeared the following spring in the great storm off Cape Nome. It was thought that she had been ground to kindling and sunk.

Vessels have been disappearing in this great unknown ever since the beginning of arctic navigation. In 1845, the "Erebus" and the "Terror," of the British navy, sailed with 129 souls on board to attempt the northwest passage. They were last seen by civilized men in Baffin

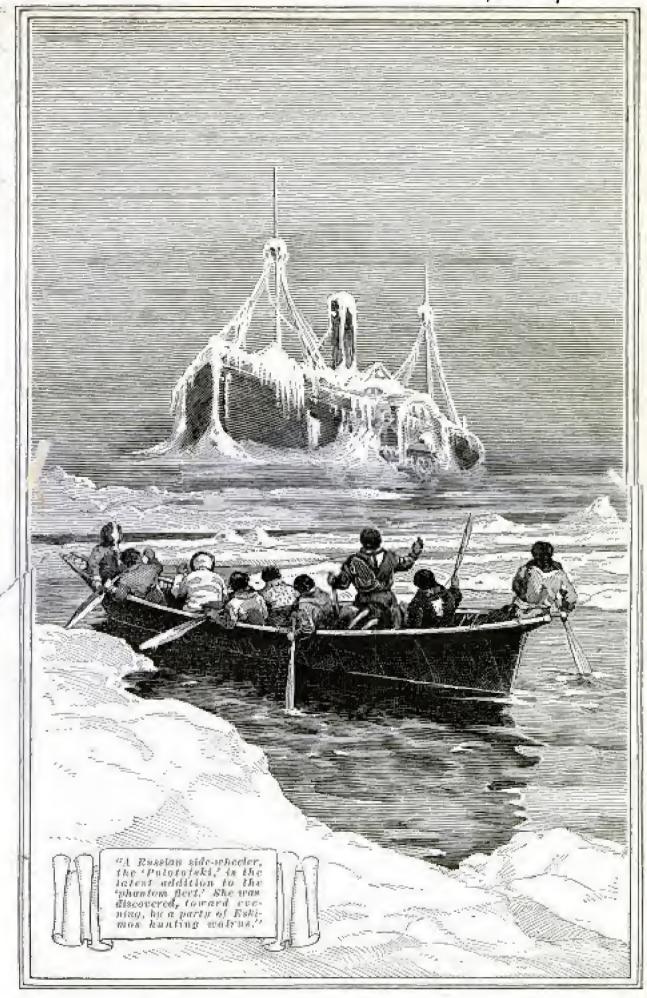
Bay. More than a score of ships, with crews of nearly 2,000 men, at an expense of millions of dollars, vainly sought, between 1847 and 1853, news of the missing squadron. The fate of the vessels is shrouded in mystery.

One dread night in the autumn of 1897, a gale carried off eight ice-locked whaling vessels. Most of the men escaped and reached Point Barrow and other points along the coast. A few refused to leave their ships, and, holding men and ships in its relentless grip, the great pack swept them far out into the vast uncharted polar basin.

Were these ships crushed? Have they been battered to pieces, or are they still afloat? Did the men die from starvation and cold, or can it be that somewhere in the frozen north there still exists a remnant of the men who stuck to their ships?

These questions have never been answered. Only seldom is it that any definite trace is left. The "Polotofski's" name plate could be made out. The ship had a distinctive build. Usually the Eskimos can do no more than guess at the ships' identity. It is impossible to be certain.

Before the days of wireless a number of large ships were swallowed up, per-



haps the victims of a floating iceberg, a heavy gale, a tidal wave, or fire. One of these was the "City of Glasgow." 1845, she sailed from the Mersey for Philadelphia with 480 passengers. Port was never reached. The captain of the "Westmoreland," a vessel that preceded the "City of Glasgow" by a few days, reported that on the third day out he became entangled in ice floes and was imbedded in them for 30 hours. His evidence, and that of other captains, indicates that this extraordinary ice mass extended in one direction for 347 miles, almost compact, and that it was studded with numerous icebergs of gigantic size. What had become of the "City of Glasgow" was never learned.

Loaded with passengers, the "City of Boston," in 1870, left Liverpool never to return. Months afterward bits of wreckage were sighted with her name on them. Why, how, when, or where she entered the "Port of Missing Ships" has never been discovered.

Another mystery is that of the "President." She was due in Liverpool from New York in November, 1841 Severe weather had prevailed in the Atlantic and unusum! quantities of ice were reported in low altitudes. For months the owners queried adjacent ports in a vain effort to get some news of her. Years later there was found in the loghook of a Portuguese sailing vessel an entry which stated that a large steamer, resembling the "President," with her machinery ap-

parently disabled, had been sighted. This entry was dated a month after the disappearance of the "President."

Could these ships have drifted northward? Are they, too, part of that fleet of silent ships held hard and fast in the great ice pack, white with frost and manned by frozen crews?

Sometimes a vessel is found abandoned at sea without any trace of accident or other means of discovering the cause of her condition. Such was the case with the "Yula Maru," a Japanese steamer found in mid-ocean with eight dead men on her deck. What had become of the rest of the crew was never known.

rest of the crew was never known.

The "Marie Celeste" was discovered with all sails set, clipping along toward Labrador. Not a man was on board the vessel nor was there any evidence of a struggle; nothing in the log to tell of storm, disease, fire, or other disaster.

The little schooner, "Teddy Bear," missing eight months and believed lost, was found this June frozen in, near the mouth of the Potem River, 12 miles south of Emma, a village on East Cape, Siberia. All on board were well and required no assistance from the coast-guard vessel which discovered them. The captain was waiting for the ice to clear out of the river. When this should happen he intended sailing back to Nome.

Only miraculous luck saved the "Teddy Bear" from joining the phantom fleet, of which the "Polotofski" remains the sole, materialization.

### MOUNT WILSON OBSERVATORY

An accurate reproduction, on a miniature scale, of the Mount Wilson observatory grounds located in the southern part of California, has recently been completed by Ferdinand Ellerman of that state. The model clearly shows the shelter for the 100-inch Hooker telescope, the 60-foot tower for the Snow telescope, and the 150-foot tower on which is mounted the 60-inch reflector. Imitation snow on the ground around these and the numerous small buildings, together with many tiny pine trees which are scattered over the work, give the whole a natural and attractive appearance.



Model of the Mount Wilson Observatory and Grounds, Showing, from Left to Right, the 60-Foot Tower with the Snow Telescope, the 150-Foot Tower and 60-Inch Reflector, and the Structure Housing the 100-Inch Telescope: Among the Other Buildings Is a Monastery, at the Extreme Left

and H. Ellerman, Pasadena.

red marria

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Spray System for Cooling Water being Installed at Hutchinson, Kansas: Water is Passed to the Sprinklers by Pipes on the Bed of the Creek: ofter Cooling, the Water is Caught by an Intake Earther Downstream

### CREEK DRIED UP FOR 276 FEET

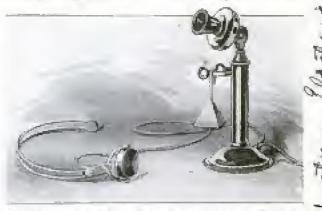
To install a spray water-cooling system in the water plant of the United Water, Gas & Electric Company, at Hutchinson, Kan., the engineers in charge of the work dammed up the creek and dried the bed for a distance of 276 feet. The water was held back for two weeks while the pipes were being laid and connected by a dam consisting of three thicknesses of 1-inch planks dovetailed so as to be water-tight.

The spray system was installed to enable water taken through the plant once, to be cooled and drawn into the pipes again, instead of being emptied into the creek below the intake and allowed to flow away. This precaution was thought necessary because, although there is a dam below the plant to hold water for use, the hot water could not be emptied above the dam for use again. In the summer, the operation of the plant was endangered by water shortage.

The water is now pumped back above the dam through a large 16-inch pipe. At intervals of 13 feet, there stand 2-inch pipes, 9 feet high, at the top of which are five nozzles. The surface of the creek is about 5 feet above the main pipe. The water is forced up to the nozzle, and projected for 15 feet into the air. The drop of 19 feet sprays the water and cools it sufficiently for use in the cooling system of the plant another time.

### "REWRITE MEN" GAIN TIME

Planning to gain the time ordinarily used in taking the telephone receiver from its hook, a large western daily recently equipped the telephones of its



Headpieces are Attached to the Telephones Used by the "Rewrite Men" on a Western Newspaper

editors and "rewrite men" with simply constructed headpieces. The receiver now used is about the size of a radio receiver and is attached to a wire bracket, A paper weight with the tip of its spindle curved, holds the telephone hook when the phone is not in use.

■A fleet of motorcycles whose riders sweep up glass has been put into service by the Chicago Motor Club. The motorcycles respond quickly when notified of an accumulation, and carry the glass away. Sept. Cinema Camera Statistitos due 350 POPULAR MECHANICS new york 6

### OR MOTION PICTURES

There is now being manufactured a camera which can be carried in the pocket, operates automatically with the precision of a high-grade watch, and



Contact Prints from Two Sections of Film Which Show the Type of Pictures Obtained with the Pocket Camera

takes either motion pictures, snapshots, or time exposures simply by pressing a button. No tripod or hand crank is required, the camera being held in the hands and the image located by either of the two methods provided. A metal spring propels the film, at the same time opening and closing the shutter. Loading is accomplished in daylight by means

of special metal magazines, six of which are supplied with each camera.

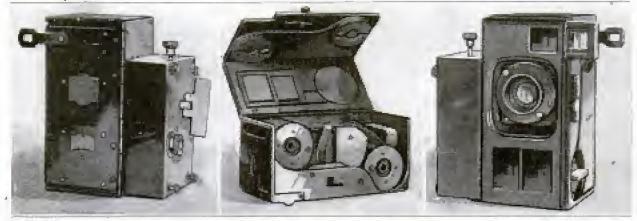
The camera weighs less than 4 pounds, measures 4 by 5 by 6½ inches, and is fitted with a high-grade lens capable of producing results equaling the professional motion-picture outht. Standard-width films are used, and each picture is ¾ by 1 inch. There are four perforations on each side of each picture, making it possible to project the pictures on any standard motion-picture machine. The camera accommodates 15½ feet of film, allowing 248 exposures, or 16 to the foot. The film is moved from one magazine to the other at the rate of 1 foot per second.

### INVASION OF U. S. TREES P 2 BY EUROPEAN MOTHS

Immigrated from its native haunt in Europe, a species of moth, commonly known as the satin moth, has been doing great damage to the poplars, willows, and cottonwoods of the New England states. The new pest has become thoroughly established within the last few years, but was not discovered until recently. It is exceedingly difficult to control the insects. They fly readily, often in swarms, and flit from one place to another. Both male and female have pure-white wings and their bodies are covered with long white hairs, giving an appearance of a coat of satin.

COVER FOR REAR AUTO SEAT

The development of the sports body for an automobile that is mainly used as a roadster, but can upon occasion provide seats for passengers in the rear, has brought some interesting problems to



Left: Rear of Camera, with Release Button on Tup, Winding Handle and Timing Mechanism at Side. Center: Interior, Showing Film Magazines. Right: Front; Lens in Middle and View Finders at Upper Right

The el Muminating Engineer. 9636 POPULAR (MECHANICS 351



the designers. The disposal of the cover, when the rear seat is in use, was one of the most difficult questions, but has been answered by one manufacturer in a neat and attractive manner. It is made in two portions, the front part being hinged at the forward edge and supplied with three round panes of heavy glass. When the rear seat is to be used, this part of the cover is raised and locked with brackets on the sides. In the raised position, it forms a serviceable windshield for the occupants of the back seat.

#### CLEVER CONTROL VALVE MADE FOR ISOLATED LIGHTS

For use in marine or aerial lighthouses. where the lighting of the lamp is to be automatic, a new control valve has been

devised that has some marked advantages over older instruments of this character. Two glass bulbs, filled with volatile liquid and vapor of the same, are connected and supported on a carrier. This is free to rock on pivots and is connected to the valve supplying gas to the light. One of the bulbs is blackened and the other left trans-When exposed parent. to daylight, the blackened bulb absorbs more light than the transparent bulb with a consequent increase in temperature. This causes liquid to move to the transparent bulb, and the carrier

rocks on its pivots, thus closing the gas-supply valve.

that outfits similar to this could be oper-

Third by Kratchowill
Third, muccoda Wich

OLD MOTOR-CAR ENGINE HELPS 1 24 WITH ICE HARVEST

Ingénuity played an important part in the harvesting of the ice crop at the village of Mascoda, Wis. Two brothers who do automobile-repair work decided that they might just as well as not put to work during the ice harvest one of the engines that they had salvaged from a wrecked motor car. After some planning and experimenting, they rigged up a power ice saw that cut its way through the ice, running at high speed. They used a saw 40 inches in diameter and found that they could cut ice 16 inches in thick-The machine proved so compact that one man could operate it, and thus take the place of several men working with ordinary handsaws. It is thought



Ice-Harvesting Outfit, Showing the Large Circular Saw Which Cuts through 16 Inches of Ice, Rigged Up in Conjunction with an Old Motor-Car Engine

Central Padio Co are POPULAR MECHANICS Kansas City Ind.

9 10 VARIOMETER FOR RADIO SET

Variometers—those little coils sometimes so necessary for the correct "tuning



in" of a radio set-are being manufactured after a neat pattern by a Missouri company, Two coils of the usual concentric design, the inner one pivoting on a fiber shaft, are fastened to a wooden base by a fiber strap. The whole is then screwed onto

a brass strip which contains holes for the proper mounting on the panel of the receiving set.

COMMODIOUS RIVER LAUNCH

What is said to be the largest pleasure craft ever built on the upper Mississippi has just been completed for Dr. William J. Mayo, the famous Rochester, Minn., surgeon. The boat, christened the "North Star," measures 120 feet in length, 23 feet

vided with the most modern equipment, "North Star" has cost of white oak, .000. The framework is of white oak, \$100,000. The woodwork of the cabins, staterooms, and deckhouse is of mahogany, which is light and yet extremely durable. The boat was designed especially for cruising along the Mississippi, which is not always deep, particularly along its upper reaches, and for this reason draws only 30 inches of water. Twin screws, 32 inches in diameter, are fitted in tunnels in the bottom of the boat, so that they will not strike obstructions in the shallows. This saves about 20 inches on the draft, and means but a slight loss in efficiency. The boat also has twin rudders,

The power is derived from two 200horsepower gasoline motors, which drive the launch at a speed of about 14 miles downstream and 7 miles upstream. Eight fuel tanks having a total capacity of 2,500 gallons have been installed. In normal cruising, the consumption will be about

45 gallons per hour,

A spacious salon occupies the forward end of the main deck, with piano, builtin bookcases, and other attributes of The dining room has built-in comfort. china closets, and the galley likewise has all the latest conveniences, including a gas cookstove and an electric iceless reirigerator. There are 11 staterooms and an office for the owner. In all, eight guests may be accommodated in addition to the crew of from four to six. Sleeping quarters for the crew also are on the main deck. The staterooms and the sa-

lons, as well as the pilot house and the observation cabin, have windows covered with bronzed screen. Thus the sides may be thrown open to the breeze, or closed entirely when the weather is bad. The windows are of the Pullman type.



Doctor Mayo's New Boat Tied Up along the Bank of the Mississippi Just after the Launching

in width, and displaces about 75 tons.

Built of the finest imported woods, and pro-



The Mayo Boat from the Stern, Showing Workmen Putting on the Final Touches Before the Boat Took lts Initial Cruise

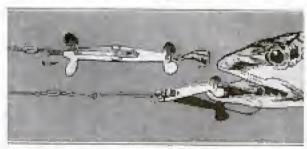


The boat is equipped with a complete filtration system, and after going through it, the drinking water is cooled by the refrigeration system, two 5-kilowatt generators furnishing the current. Each stateroom has access to a bathroom. All auxiliaries, such as pumps and capstan, are electrically driven. There is also an electric-light system, and a hot-air heating system operated by oil.

Provisions have been made for cruises lasting up to six or seven days. Though built for the Mississippi, the boat is large enough for short coastwise trips.

### FISH BAIT SNAPS LIKE TRAP USED FOR WILD ANIMALS

By a slight pull on the tail hook of a new bait, the fish that nibbles it is caught both in and outside the jaw, so that it cannot get loose. A second hook, swung back and attached to a trigger on a small metal frame, catches the fish



The Bait, as It Looks with the Hook Swung Back, is Seen Above, and Below, as It Appears When the Trigger has been Released

from the outside. The trigger is released automatically by a slight pull on the tail book. The bait is swiveled and revolves by means of propellerlike vanes. MAKE ATTRACTIVE PLAY CAR

Adapted for the use of boys or girls from 7 to 15 years of age, an attractive play car is now being manufactured that has several striking features. The car has three ball-bearing wheels equipped with pneumatic tires, and is of steel construction, including the wheels. Steering is accomplished by turning the front wheel with a foot lever operating through a parallel-motion device. The car is propelled by a small fourth wheel fastened to a lazy-tongs arrangement. A handlebar is used to operate the lazy tongs, and the little wheel is so constructed that, when force is applied to the handlebar, the wheel is locked. In this way it acts as a pusher, giving the maximum push at the beginning of the stroke and the maximum speed at the end of the stroke. The most surprising feature of the car is the case with which it moves ahead, a speed' of 12 to 15 miles per hour being possible.

### extensive safety campaign of 55 to reduce injuries

Reducing injuries—not accidents—is the aim of the Chamber of Commerce in a western city, where an extensive campaign against carelessness is now being carried on. Personal inspections are made of industrial plants, business houses, garages, gasoline stations, etc., with a view of eliminating unnecessary fire hazards, while cards and booklets containing safety hints and traffic rules are distributed by mail through information bureaus of factories, stores, and schools.

Any C.a. Carlson;

# Orincible Vacuum Cleaner Info Co 354 Unice POPULAR MECHANICS POWERFUL VACUUM CLEANER and three others reach

CAN BE EASILY MOVED



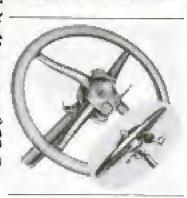
Mounted on two large rubber-tired wheels, a powerful vacuum cleaner which can be moved quickly and quietly from place to place is now attracting the attention of building superintendents.

The machine is designed to cleanthe

heaviest of floor coverings thoroughly. By the use of a brush or felt attachment, it cleans tile or wooden floors equally

#### AUTOMOBILE LOCK INSTALLED a 178 ON STEERING-WHEEL HUB

A new safety lock for automobiles is attached to the steering wheel in such a manner as to make the latter inoperative.



Strawberry Oticl

Packard En

Made of hardened steel the hub of the wheel, and grips all four spokes. Above the wheel and in front of the driver is the keyhole. After removing

the steering-wheel nut, it can be installed with a wrench and hammer in about five minutes.

#### DURABLE PAVEMENT OF WOOD DUSTLESS AND SILENT

That it will last three times as long as the usual pavement, is but one of the many merits claimed for a road material introduced by an Englishman. It is of wooden-block construction, the blocks having dovetail-shaped slots in them, of which one extends the length of the block

and three others reach across it at an angle of 30 degrees. These slots range from %s inch at the top, to 1/4 inch in width at the bottom, and are 11/4 inches in depth. When placed in the road, the slots are filled with a special bituminous rubber, or asphaltum, composition, which is said to be unaffected by either extreme , heat or cold, to provide a firm footing for horses in all kinds of weather, and to eliminate skidding of motor cars.

#### 9798 QUICKLY ADJUSTABLE JAWS ARE WRENCH FEATURE



Quickly adjustable jaws are the main feature of a monkey wrench, introduced by a Chicago man, which can be opened or closed by a pressure on a trigger. Besides the innovation that permits the rapid operation of the jaws, the tool also has incorporated in it the usual knurled thumbscrew attachment, with which the wrench can be manipulated in the ordinary manner, for the accurate adjustment of any size nuts.

### filing or cut-ting, it covers (235IS EASILY REMOVABLE AUTOMATIC VACUUM VALVE

self-contained automatic vacuum valve, now on the market, has a cylindri-

cal valve hody cast from highest-quality copper and tin, machine-finished, and with a threaded nozzle. Inside this body, above the nozzle, is a crossbar perforated in the center to act as a guide for a plunger rod, the other end of which, above the plunger disk, slides in a similar perforation in a cap connected to the top of the valve body. In this cap is

an air opening, and on it is machined a small seat for the plunger disk. On the plunger rod is a spiral spring, so light thap the least suction will open the valve.



### 9685

#### POPULAR MECHANICS



STRANGE BAILWAY CARRIES BOATS FROM LAKE TO SEA

A T one point in East Prussia, when passengers book their passage for a trip by boot, they also receive a rail-road trip for good measure, yet at no time leave the boat. The small boats with their passengers run on an inland lake and are then transferred on special cars overland to the sea. The cars run on rails laid under the water, to take up the boats for the cross-country journey.



STEAMER RUNS INTO OPEN DRAWBRIDGE AND WRECKS IT

THE swing span of the drawbridge over the Hackensack River, between Jersey City and Newark, N. J., was wrecked recently when a 2,100-ton steel steamer ran into it while the span was fully open and in position directly above the fender piling. As seen, the span broke in two at the center pier, and each half fell upon the piling. Five men in the operating tower escaped unburt. Ferry service was established immediately after the destruction of the bridge, which was the crossing for the Lincoln Highway traffic, and a temporary crossing crecked pending the construction of a new draw span. There was a strong tide running in at the time the vessel came up the river, and it is believed that this might have been the cause of the accident.

Coul. Themas R. Flanagen

Borg + bleck & michigan are 914 S. michigan are POPULAR MECHANICS

AUTO-TEMPERATURE INDICATOR

The temperature at which a gasoline motor operates has an important bearing



Dial of Temperature Indicator for Automobiles Which can be Mounted on the Dashboard of the Machine

on its economy and upkeep, and should be known at all times to insure best results. There is now on the market a device, consisting of a control unit, that fastens to the motor and has a flexible shaft leading to the instrument board. It is there connected to a pointer that shows on a colored dial whether the motor is operating at an efficient temperature or is running too hot or too cold.

### "WOODEN POLICEMEN" GUARD

"Wooden policemen" brandishing heavy spiked clubs on which is written "Keep off the Grass!" are used by the University of Wyoming to keep pedestrians from



Students of the University of Wyoming Made a Number of These Wooden Figures to Keep Pedestrians from: Walking on the College Campus

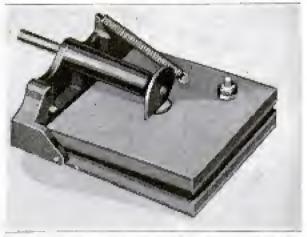
trampling the college lawns. The effigies are 26 inches high and mounted on a stake about 10 inches long. They were made by a student organization.

#### SPRAY DRAINS WITH ASPHALT TO CONTROL MOSQUITOES

Finding the use of ordinary water drains inadequate in a fight to control the breeding of mosquitoes, the health department of Trinidad, British West Indies, is spraying the drains with liquid asphalt. It was found that clearing the drains of grass was not only expensive but ineffective; for the heavy tropical rains often washed down the banks, leaving little pools of water, in which mosquitoes bred freely, scattered along the sides. Asphalt is spread along the drains and burned, while a combination of oil is thrown on to provide the heat necessary to volatilize its lighter constituents.

### RADIO VARIABLE CONDENSER OF NEAT CONSTRUCTION

One of the neatest of the many variable condensers for use with radio apparatus, is the type now being manufactured by



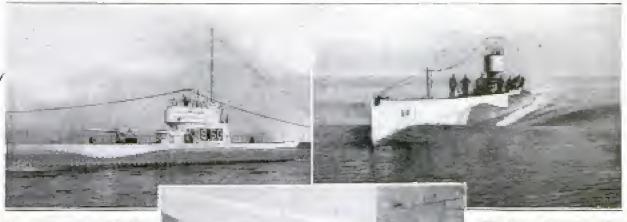
Variable Condenser for Radio Set, Showing the Two Wooden Plates with Spring Tension on Top and the Specially Designed Cam

a concern in Cincinnati, Ohio. The essentials of the condenser are two thin sheets of copper—one of them covered by a sheet of mica—fastened on two small laminated wooden plates. The plates are so arranged that they are opened from the side with a booklike action which is controlled by a specially designed cam and spring tension. There being no friction between the different parts, these last indefinitely, and are said to be absolutely proof against voltage punctures or showering.

Crosley mp. Co.

Having passed all acceptance tests, with new records established, the submarines "5-49" and "S-50" have been commissioned, and are now a part of the undersea flotilla of the United States Navy. are powered by storage batteries through motor-driven reduction gears,

The vessels are also equipped with a complete high-powered wireless outfit. Experiments on these boats with under-



Formal Acceptance of the "S-50" at Bridgeport, Connecticut, by Officers of the United States Navy: Note How the Breechlock of the Rifle is Made Water-Tight

The Submarine "S-50" Leaving Brooklyn Navy Yard after being Provisioned for Regular Setveice: New Records were Established in the Preliminary Tests

The addition of these two underwater craft provides the last word in submarine defense for the United States. They are two of four sister ships, the others being the "S-51,"

which is now undergoing preliminary acceptance trials, and the "S-48," which sank off Bridgeport Harbor in Long Island Sound during acceptance trials, but was later raised. All four S-boats have an average length of 240 feet, with a surface displacement of over 900 tons. They have a cruising radius of 3,000 miles under normal conditions, but it is estimated this can, under duress, be extended to a greater distance.

The sting of these wasps of the sea is provided for by the mounting of a 4-inch rifle on the forward deck and the installation of five torpedo tubes, four in the bow and one in the stern. To take up the recoil from the rifle fire, special steel framing reinforces the deck below the gunmounting platform.

According to unofficial reports the speed of the latest S-boats is between 22 and 23 miles an hour on the surface. Propulsion is by the latest-type Diesel engines, designed by the navy engineering department. Under water the craft

While on a Two-Hour Runduring Trial Tests, the "S-51" Kept in Touch with Its Base by the Use of Carrier Pigeons. Wireless was Not Installed Yet

water communication by wireless have resulted in valuable data for further development of the equipment required for this purpose During the official tests of the Navy Department, con-

stant communication with land was keptup by the use of carrier pigeons which were periodically let loose with messages to be returned to the test base. This step was taken to prevent a repetition of the "S-48" mishap which nearly resulted fatally. The two remaining boats, now being prepared for final trials, will complete the program of the United States Navy in the S-boat class.

### SOCIETY TO AID CHILDREN 9841 IN STUDY OF BIRDS

Thirty thousand dollars has been received by the National Association of Audubon Societies to be used in aiding teachers and pupils in the study of wild birds. Teachers who form clubs are to be given free material to help them in their work. More than 1,700,000 children are already enrolled in schools throughout the United States and Canada. The headquarters of the association is in New York City.

E Gualifan Bounty

no. nother

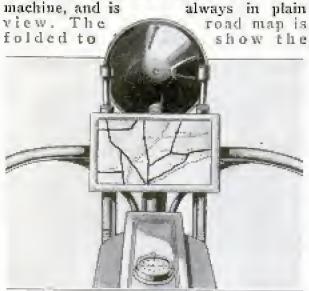
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1 m. m. Holst, 1335 Israul St.
358 Llenor. POPULAR MECHANICS

MAP HOLDER FOR MOTORCYCLE FASTENS TO HANDLEBARS

Motorcyclists will appreciate a handy and inexpensive map holder which can be fastened to the handlebars of the



Motorcycle Road-Map Holder Which Fastens to the Handlebara, Showing How It is Placed Directly before the Eyes of the Rider

route to be traveled and then inserted in the holder, which has a transparent celluloid cover. The rider thus has the map before his eyes at all times, and need not stop every few miles to take it out of his pocket for consultation.

### NATIONALITY AND REGISTRY NARKS FOR AIR CRAFT

As part of a comprehensive program to assist in assuring safe practices in aircraft operation, an airship register has been devised. This movement is fostered by the National Aircraft Underwriters' Association. That organization has felt

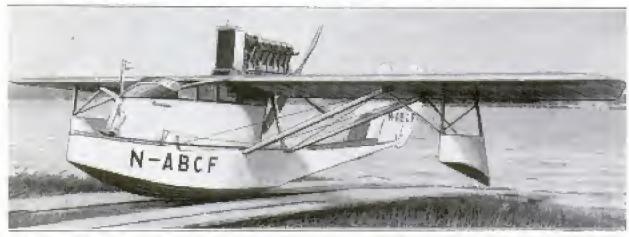
the pressing and growing need for nationality and registration marks for private and commercial airplanes.

The nationality mark is represented by a capital letter, as, for instance, "N" for the United States. Its use is not required for air craft that remain within the United States, but only for those following international routes.

The registration mark consists of four capital letters, at least one of which is a vowel; for this purpose the letter "Y" is considered a vowel. On air craft other than state and commercial, the registration mark is underlined with a black line.

Specific rules govern the painting of the nationality and registration marks. They must be in black on a white ground, painted once on the lower surface of the lower main planes and once on the upper surface of the top main planes, and also along each side of the fuselage, between the main planes and the tail planes. It is provided, in addition, that the nationality mark be painted on both sides of the rudder. The letters on the wings are to have a height of four-fifths of the chord, and in the case of the rudder, to be as large as possible. The prescribed width of the letters is two-thirds of their height, and all letters are to be in plain block type and uniform in shape and size. A hyphen separates the nationality and registration marks. In general, the marks should be displayed to the best advantage, and must be kept clear and visible. The registration marks will also serve as the "call signs" of the air craft in all radio or other signaling.

Whenever an owner or operator applies for registration of his air craft, he must give all essential information regarding it. This information, as abstracted in the register, will have an important bearing upon many phases of insurance.



Hydroplane, Showing the Markings Which the National Aircraft Underwriters' Association has Designed to Appear on Flying Coals, and Which will Serve as a Ready Means of Identifying the Owner

Cont: Eserge

F. Paul

and, 200 Ellsworth Blds Chopyrighted material

### OMMENT AND REVIEW

fThese pages were printed July 25, 1922.1

STORIES are not wanting of locomotives with no one aboard suddenly going into action and dashing off down the line, to the consternation of trainmen and dispatchers and danger of collision with other trains. Machinery also will start

Runaway Ship

or stop at times without human intervention. Derelicts at sea frequently accomplish voyages of thousands of miles before they are reported, sought out, and sunk. It is impossible to convince the old salt-water seaman that ships do not possess certain mysterious powers of action over which captain and crew have no control.

A curious instance of this kind happened recently in the Boston harbor. The Shipping Board steamer, the "Wakanna," had been condemned to end her days by being taken to a lonesome beach far from the busy lanes of vessels, and burned. She had been for some time securely anchored, while the nature of her fate was being considered. Finally it was decided. Then, at night, she slipped her moorings, and without captain, pilot, or crew on board, silently threaded her way through the harbor, out among tortuous channels, and around dangerous rocks and reefs, to navigate which, even in daytime, requires experienced pilots to pass in safety, and out toward the great ocean.

Early next morning the escape was discovered, and government tugs chased out after the truant. Finally she was overtaken, and towed back to await the ordeal by fire which occurred a few days later. Old salts shook their heads and declared, "She knew what was coming," and one might as well try to convince them the ocean is fresh water as to reason them out of their belief.

#### 

A FTER the petition for independence of the Philippine Islands, which has been so strongly and ably urged by a distinguished delegation to Washington from the islands, and all the arguments for and against, which the politicians so confidently declare, it is informing to have the views of an Ameri-

Independence for the Philippines |

can who is now and has been in successful business there for several years. During our interview he explained why it is not practical at present, and in his judgment cannot be for many years to come.

He paid the highest tribute to the educational, judicial, and financial systems which the United States has established and maintains there. Our government of the islands has been excel-

lent, and in the larger cities and a considerable zone about them the natives have developed to a point where they could doubtless stand alone in many respects, for the Filipino is possessed of no small amount of natural ability, which education quickly develops. The great difficulty is the want of solidarity, and the huge task of bringing about any such condition. Conditions there are comparable to those small European mountain states where the people of one province have centuriesold customs and habits, each peculiar to itself; and where the inhabitants of one cannot read, speak, or understand the language of another, perhaps only a few miles away. The same is true in the islands, with the additional handicap that as yet the great majority of the people are very ignorant, and many of them semieavage or worse. There are scores of tribes numbering thousands of members each, who still maintain their hatred of certain other tribes, and it is only the presence of our forces there which restrains many tribes from warfare and plunder of others. The Spaniards made little or no effort to prevent these periodical incursions, and, he said, with American restraint removed, it would be a matter of only a few days, or even hours, before many tribes would be in action again, so over-whelming is the preponderance of what may be designated as "wild men" over the civilized. Then, too, distances between the various islands, of which there are hundreds, are much greater than we here at home realize, and there are periods of days, at times, when travel between certain islands is impossible.

By no means do all the islanders want to be educated, and thousands of adults are quite incapable of learning even what we call the rudiments. They love their wild state, in which they and their ancestors have lived for centuries; it satisfies every want, then why make the radical change to the white man's mode of life?

#### POPULAR MECHANICS

The difference in mentality among different tribes is more pronounced even than the social status of the classes was in European countries 50 years ago.

In many, probably most, ways we would be better off had we never acquired these possessions. It is doubtless a matter of indifference to most of our citizens whether we have them or not.

We may fairly ask ourselves the question, "When will all the islanders become

civilized?" in our sense of the word.

We may also ask ourselves, "When will the millions of square miles of useless" and now waste land in the United States become productive?"

Some day, perhaps, but not in our time.

T is not so long ago that lepers were scarcely thought of except as connected with incidents in the Bible. Even with a better knowledge of what are now the Hawaiian Islands, and increased travel among oriental lands, we unconsciously

thought of lepers as something a long, long way off. Certainly we never entertained the idea that it was anything which immediately concerned us personally, and least of all as ever becoming What a danger and menace here at home. about the Lepers?

But like many other things which could not happen, it has. We have lepers in 25 states. In spite of the research and noble efforts of the medical profession, and the confident claims from time to time that a cure had at last been found, the terrible fact

is that as yet there is no certain remedy to remove the curse or prevent it if one is effectively exposed.

The very best that medical science has as yet to offer is the absolute quaran-

tine of the afflicted, that their living death be not communicated to others.

The Federal government has but one leprosarium, in Louisians, and its limit of 200 patients is already filled to capacity. Something must be done, and at once,

or like a deluge or forest fire, it will get beyond control.

The Red Cross, with its national organizations, which functioned so promptly and efficiently in the great war, might well lend itself to this growing menace here in our own midst. It is not a matter which villages, towns, cities, or even states can handle effectively by themselves. It requires an organization of national reach and strength such as the Red Cross already has. Aid to the needy and suffering on the other side of the globe is commendable, but not more so than the care of the 1,000 lepers who at present are properly denied admittance to almshouses, hospitals, and sanitariums. Dr. C. H. Lavinder, assistant surgeon-general, declares isolation is at present the only way.

#### 

 $\mathbf{T}^{ ext{HE}}$  cyclonic-minded captain of the vastest pirate crew ever assembled, is now in a fair way to lose that mind, and with it his grasp on the soviet government of Russia.

Russia the Helpless

Exhausted are the fabulous hoardings of the czars; stripped of gems and gold, the Russian churches are as bare as a barn; banks and the possessions of merchants are alike looted; granaries which could be located are empty, and the husbandmen refuse to plant more than enough to supply their smallest actual needs. The proverbial drunken sailor in his wildest excesses is a miserable piker to the debauch of a whole nation. And now, after sending millions to spend in bolshevistic propaganda in other

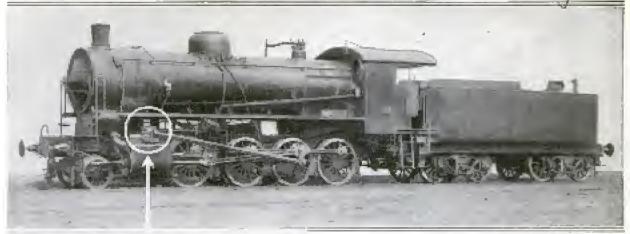
lands, the gold basis of a monetary system which Lenine declared to despise finally is recognized to the extent of asking a gold loan, at the Hague, from any nation which will lend.

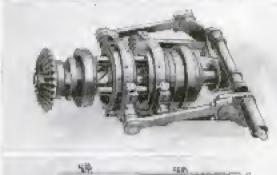
The structure of centuries, with tremendous power and apparently inexhaustible resources, that great tower of strength, has been steadily falling, piece by piece, and now like the man who tore it down, is a monstrous wreck.

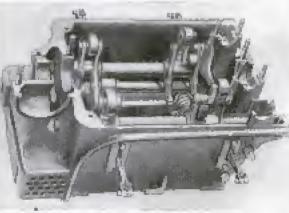
Some day a real leader, using brain force instead of brute force, will be raised What most glorious opportunity of the centuries to redeem and rehabilitate a great empire!

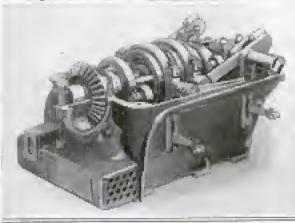
H. H. WINDSOR

### DESIGN POPPET-VALVE GEAR FOR LOCOMOTIVES









In an effort to overcome the faults common to the standard types of link-motion valve gears used on locomotives, a new gear has been designed that, in trials, has shown marked economy of coal and water for the power developed. In

Above: Italian Locomotive Fitted Experimentally with a New System of Popper Valves, Installed in a Box Connected with the Steam Chests of the Cylinders. Left: The Driving Gear, Came, Reversing Shaft, and Rode Removed from the Box, Leaving It in the Condition Shown Below; and Below That Again Is the Whole with the Box Cover Removed

the new system, poppet valves are used, to avoid the faults of both the flat slide valve and the piston valve. The operation of the poppet valves is controlled by cams located on a short shaft incased above the steam chest, the shaft being driven, through hevel gears, from the driving axle of the engine. The angular position of the cams on the shaft may be changed while running, through the use of a screw and sliding sleeves. Advantages claimed are that no strangulation of the steam occurs, and more effective use of the power of expansion of the steam js possible.

#### NEW EXPLOSIVE COMPOUND HAS IDEAL QUALITIES

A Minnesota inventor has compounded an explosive which has demonstrated remarkable qualities in recent experiments. While appearing to have great disruptive powers if closely confined, as in a shell or drill hole, it can then be exploded only by means of a blasting cap or electric detonator. It is reported to give off no noxious fumes, that it will not explode when heated to 212° F., that it will not freeze, and that it cannot be accidentally exploded by shock.

To suit different kinds of glass, it is recommended that the limes used in their manufacture be divided into three classes, containing, respectively, 96, 91, and 83 per cent of oxides of calcium and magnesium. The variation from day to day should not exceed 2 per cent.

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dno.

Landwer & Hass 2823 Hoffer MECHANICS

#### DEVICE HOLDS AUTO CURTAINS READY FOR INSTANT USE

Auto side curtains are held ready for instant use by means of a new device,

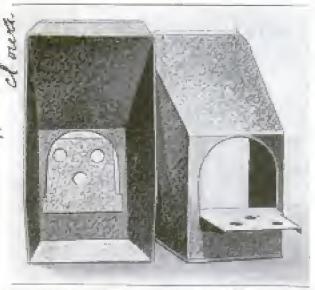


Above: Strap for Holding Side Curtains of an Automobile. Below is Shown the Manner in Which the Straps are Used

consisting of a metal clasp which fits under the padding strip, and a web strap that goes around the rolled curtain and hooks to the clasp. To let down the curtains it is only necessary to unhook the straps holding them.

### 7 24 SANITARY HEN'S NEST

The old-fashioned dirty hen nest seems to be doomed to extinction by a metal



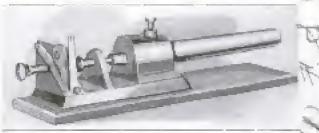
Two Views of Sanitary Hen's Nest, Made of Sheet Metal, So That It can be Scalded to Keep It Clean

nest—the recent invention of an Iowa farmer—which can be scalded periodically. A false bottom is another feature of the nest. It consists of a metal frame

with holes, through which the eggs roll out of sight. This prevents the hen from litting on the eggs, eating them, or getting them dirty. The nest can also be used as a coop. It is hung on two nails and is easily moved.

### BURGLAR GUN IS EFFECTIVE TO FRIGHTEN OR KILL

Burglars or other prowlers may be eifectively guarded against with the aid of a contrivance resembling a small cannon, which has been produced by an Alabama man. The invention consists of about 10 inches of a shotgun barrel, mounted in a substantial breech and so arranged that a plunger spring, which fires the shell, is loosed by a disarrangement of the thread or string attached thereto. The outlit is especially adapted for the protection of isolated buildings in small towns or villages, and may be loaded with deadly buckshot to kill, or with merely a blank-



This Burglar Gun may be Loaded with Blank or J Loaded Shells, and is Operated by the Breaking of a String

shell to frighten away the would-be in-

#### GASKETS FOR FLANGE UNIONS IN THE FORM OF A PASTE

Every man may be his own gasket maker by using a paste, now on the market, which is applied with the fingers to any flange union where a gasket or washer is required. It is specially applicable for use on gasoline engines, as it will stand high pressures and temperatures, and it is leakproof against gasoline, kerosene, oil, and water. Although the paste permanently seals the union, it does not coment it. The parts can be readily separated, whenever desired, and the paste can be scraped off with a knife blade.

¶We want all our readers to write us freely and often whenever they wish additional information on articles published in this magazine. Address Bureau of Information, Popular Mechanics, Chicago.

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Gasoline Cruising Launch with Fore and Alt Cabins, and Single Control under the Awning Amidships: The Bont Is 36 Feet 5 Inches Long, 2 Feet 10 Inches Wide, and with a 35-Horsepower Mosor Makes 15 Miles an Hour. There Are Sleeping Quarters for 8 to 10 Passengers.

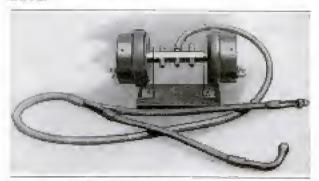
Pittsburgh, Pa

#### GASOLINE CRUISING LAUNCH BUILT WITH TWO CABINS

Constructed particularly for use on inland waters is a cruising launch that is 36 feet 6 inches long, 9 feet 10 inches wide, and that normally has a 35-horsepower motor, giving it a speed of 15 miles an hour, but is so rigidly built that any motor up to 100 horsepower can be installed in it, giving the launch a proportionately greater speed. The boat has fore and aft cabins, electrically lighted, a lavatory, and sleeping quarters for 8 to 10 passengers. Under an awaing amidships is a singlehanded control.

### SIX PERSONS MAY LISTEN IN WITH RADIO ATTACHMENT

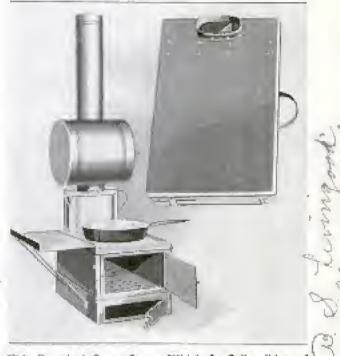
Six persons may listen in to radio concerts, simultaneously and with rubbertube ear pieces instead of the more expensive amplifiers and loud-speaking horns. A Pennsylvania man has designed a nickeled-brass attachment that fits into the ear apertures of two receivers and possesses six branch tubes, to which the half dozen listening contrivances are affixed.



Simple Radio-Receiver with Attachment Enabling Six Persons to Listen In it Same Time

GAMP STOVE THAT FOLDS

Designed to burn either wood or charcoal and equipped with a baking oven, water container, and coffeepot, a seem-



This Practical Camp Stove, Which Is Collapsible and Burns Wood or Charcoal, Has a Water Heater and a Baking Oven. It Folds into a Flat Package, That is Easily Carried in the Rear Seat or on the Running Board of a Car

ingly very practical camp stove is now being marketed by an eastern concern. Its chief advantage, however, lies in the fact that it can be folded into flat compact size with its largest measurement 20½ inches, so that it is easily carried in the back seat or on the running board of an automobile, or packed with other camp equipment.

Elverson Canterial

Smith Hollo 55 th & Cottage Isrove,
364 Chicago POPULAR MECHANICS

### OF WAX AND PAPIER-MACHE

Lifelike dolls, of which the head and shoulders are modeled in wax, while the remainder of the body is made of papier-



maché, are the product of a Chicago manufacturer. Human hair adorns the heads and is also used for the eyebrows and cyclashes. The eyes are of glass, such as are sometimes used by persons who have lost an eye, and the teeth are constructed of the same material as the false sets made for dentists.

m. a. J. Columes

### CYLINDER-GRINDING COMPOUND OF THE PROPERTY OF

For gasoline motors there is now available a cylinder-grinding compound that is mixed with the lubricating oil, and it is claimed for it that when the engine is run, it grinds the cylinder walls and the piston rings to a perfect fit. The compound is fast-cutting at the start, but it gradually pulverizes to a polishing fineness, and then escapes from the cylinders altogether. The work of regrinding cylinders can therefore be done speedily and by an unskilled operator.

ROAD-MAINTENANCE OF TELT

Road-maintenance work on the rural highways has been benefited by the introduction of an outfit which is constructed as an attachment for a tractor. The implement has but one pivot wheel at the rear, thus permitting the workman to execute a square turn, and four blades instead of the customary single cutting edge. The blades are operated by power from the motor and are controlled by pedals under the driver's feet, the whole contrivance being manipulated by one man.



This New Road-Maintenance Machine Consists of a Three-Wheeled Tractor and the Scraper Attachment, Which Has Four Independent Blades Instead of the Customary Single Cutter. The Blades are

Adjusted to the Road Surface by Meanspot Foot Levers

myr. The Square Jury

Co

9577

### BUZZARDS-AND HIGH-VOLTAGE TRANSMISSION LINES,

BY NORMAN C. McLOUD, 17/

**B**UZZARDS are getting educated. They are rapidly learning that it is poor and dangerous business to attempt to take liberties with high-voltage transmission lines charged with electricity.

The buzzard is a born sentry, for it finds the carrion flesh which is its food by the sense of sight rather than by the sense of smell, and with the building of the first longdistance electric - transmis-sion lines, the buzzards hailed the steel supporting towers as something new in the matter of sentry stations. But in taking advantage of this man-made improvement they created a new hazard for themselves and, incidentally, a new problem for the engineers of the electric - power companies.

Engineering charts kept by the Pennsylvania Water and Power Company show that the buzzards have been no mean factor in the interrup-

tion of current transmission. The socalled turkey buzzard is the largest of the native birds in Pennsylvania and Maryland, with a normal height of 2 feet, and a wing spread of from 5 to 6 feet. The towers of the transmission line range in height from 60 to 130 feet, and it is not surprising that the buzzards should choose these vantage points for their lookout stations. As long as they sat still on one of the crossarms, they were perfectly safe, but when it came to spreading their wings for flight, something was quite certain to happen. The space between the perch and the wire was not sufficient to accommo-

date their wing spread without establishing contact, and a short circuit was inevitable. This mishap invariably killed the buzzard and sometimes resulted in placing the transmission lines momentarily out of commission,

In seeking a remedy, the engineers were more concerned for continuity of power flow than for saying the lives of the birds. The results have been of importance to both sides, however, for by increasing the clearance space between wires the company has reduced the likelihood of interference by the buzzards. From 26 inches the clearance space has been increased to a maximum of something over



At the Top is Shown One of the Buzzards Which was Electrocuted When Its Wings Came in Contact with the High-Tension Transmission Lines. At the Bottom are Seen Different Types of Towers with Incressed Clearance Space between the Wires

40 inches, thus giving the birds a better chance to escape without being killed.

■Two army airmen recently made an unusually long flight from San Antonio. Tex., to Washington, D. C., during two days of ten and eight flying hours, respectively. Leaving Kelly Field early one morning, they made stops at Houston, Tex., and Pensacola and Jacksonville, Fla., arriving at Bolling Field that evening.

Rubber Isrip for files of l. Osgord Tool Co. 265 Reflect page 365. Files of l. Osgord Jord Co.

Latteford Bros, 443 & Pearl St.
366 POPULAR MECHANICS

#### POLE FOR WIRELESS AERIAL ERECTED BY ONE MAN

Easily erected by one man and standing 30 feet 3 inches above its base, a pole



for supporting a radio aerial that is being manufactured by a Cincinnati, Ohio, concern, commends itself to the wireless enthusiast. The pole is shipped in knockdown form, consisting of four sections of bent sheet steel, each section 7 feet 10½ inches in length, and the necessary bolts, etc., for assembly. When assembled and ready to erect, the total weight is only 140 pounds, and by means of anchor lugs on the base,

it can be placed on flat-cement or composition roofs as well as on the ground.

### WISCONSIN ROAD-MAINTENANCE

Until that day in the far future when all roads in the United States are hardstraced, dragging of dirt roads will con-



One Herena 2

tinue to be, as it is now, a matterof paramount importance. Many states maintain a force of "patrolmen" who give their entire working days to dragging, and in no other state, perhaps, is this service better organized than in Wisconsin. "They drag

the roads in Wisconsin," any motor tourist will tell you who has toured through the state. The white signs with black lettering every few miles along all the main dirt highways suggest how this efficiency of service is obtained. When once a patrolman is appointed to take charge of a certain section of road, he alone is responsible for the proper maintenance of that section. He is given a number which he must wear on the front of his hat, and his name, number, and territory are inscribed on the signboard. The effect of these signboards in getting good service has been excellent.

### PLUG-TYPE REFILLABLE FUSE SIMPLE AND EFFICIENT

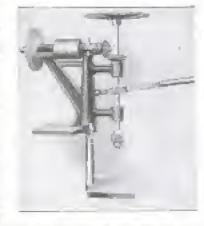


Plug-type  $refillable_{\Leftrightarrow}$ fuses, which can be handled freely by the novice in replacing () any "dead" ones in the circuit, have been introduced by a Chicago manufacturer, 🗢 innovation resembles the ordinary c plug fuse, and when "blown," is unscrewed 6 from the circuit, its 😘 top removed, the old ... filler dropped out, a new one put inside, into the circuit, the whole operation requiring but a few seconds.

#### COMBINATION SHOP MACHINE HAS VARIETY OF USES

Designed to be equally well adapted for use in the small or large shop, a new

combination power tool is now being manufactured that can be used for many operations. In general appearance, it resembles a drill press, but in addition to this, there is also a ripsaw and

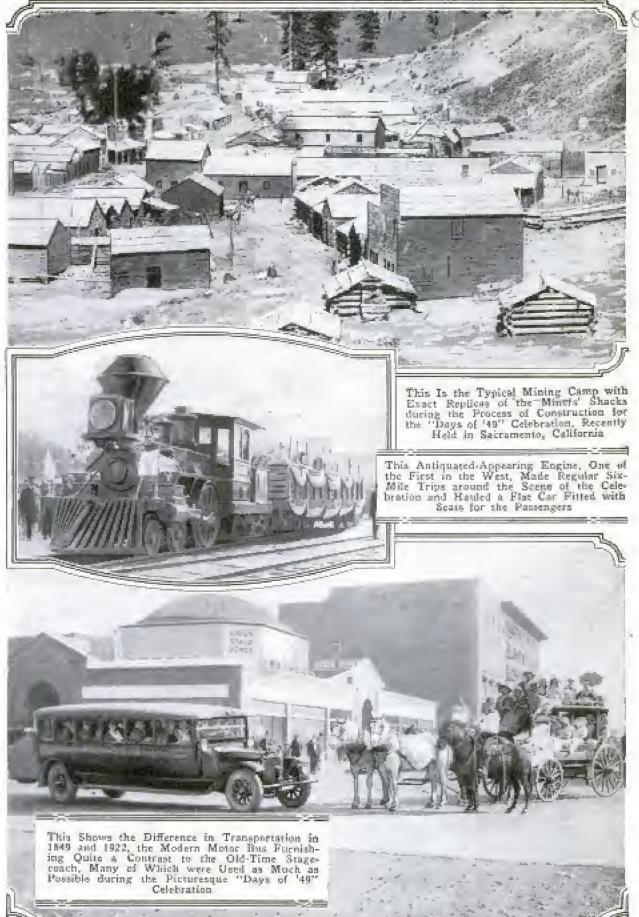


horizontal disk grinder, driven from the horizontal and vertical shafts respectively. An emery wheel or a surface wheel sander may be substituted for the ripsaw.

Ster y in Stearborn

Leter retd 10/28/22

# ROMANTIC "DAYS OF '49" ARE COMMEMORATED Bureau



Butler Vaporizer The Saint many corp POPULAR MECHANIC france

SIGHTLY ELECTRIC FLYTRAP FRENCH INVENTION

An electric flytrap, invented by a Paris electrician, is distinguished by its almost ornamental appearance. It consists of a



four-sided piece of wood with grooves in which is wound a wire connected with the electric current, This live wire is coated with a waxy preparation which attracts the flies by its peculiar odor. The coating must be removed twice a month. When a fly settles on the coil, a short circuit is produced and death follows. At the bottom is a detachable spherical receptacle into which the dead flies fall, and from which they are removed from time -to time.

HEATER FOR ORCHARDS BURNS 75 TCARBON BRIQUETTES

Briquettes of carbon are used as fuel in heaters which have been installed re-J cently in California fruit orchards as an improvement upon the smoky crude-oil smudge pots employed heretofore to pre-



Orchard Heater, Showing, at Left. Heat Deflectors; Center, Sheer-Iron Shell and Deflector Holders; Right, Cast-Iron Grate

The Authit convent damage by frost, sists of a cylindrical sheet-indn shell, a cast-iron grate, and heat deflectors in the \ shape of inverted pie pans. The grate contains an oil reservoir with an asbestos wick to burn coal oil for the purpose of igniting the carbon briquettes. pounds of these, which cost but 71/2 cents, provide sufficient heat for five of hours.

#### ACCESSORY TO HEAT GASOLINE ANAPOR GOING TO ENGINE

If the low-grade gasoline being distributed today can be thoroughly vaporized, it makes a satisfactory motor fuel, but considerable heat is required to prevent liquid-gasoline spray from finding its way into the engine cylinders, supply this heat, a vaporizer has been designed that may be placed between the carburetor and the intake manifold. The vapor is conducted through thin copper tubes, while a portion of the hot exhaust gas is circulated between the tubes and the cast-iron shell of the device.



This Gasoline Vaporizer Leads the Gasoline through Thin Copper Tubes, Heated by the Gases from the Exhaust Manifold

have shown a surprising increase in power and mileage, and a greater flexibility of the motor. 98 44

#### STARS AND STRIPES WASHED ON PACIFIC STEAMSHIPS

Started by the steamship "Kennedy," which runs between Bremerton, Wash., and Seattle, a custom has spread among ships on the Pacific to give Old Glory a regular weekly washing. Heretofore flags have usually been burned when too soiled for use.

O'coayune 7/10/21



Scene during the Record-Breaking Flood at New Orleans, This Year: The Workers are Building an Improvised Sheet-Piling Levee at a Point Where the Actual Levee Was a Foot below the Surface of the Water

### NEW ORLEANS LEARNS THE LESSON OF THIS YEAR'S FLOOD

BY THOMAS EWING DABNEY

NEW ORLEANS' entire commercial river front is being raised so that the city may be given better protection against the flood waters of the Mississippi. This means that, besides the wharves, the network of railroad tracks, street-car lines, streets, and other facilities immediately behind the wharves—representing millions in investment—must be raised to conform to the new levee grades that have been prescribed by the state authorities.

It would seem reasonable to expect that, if any part of the country had adequate levees, such as recommended by the Mississippi River Commission, it would be New Orleans, a city with a population of 400,000 and a property valuation in excess of \$800,000,000; but the fact is that the levees of New Orleans are lower than in many country districts, and of a cross section that compares with the commission's specifications as scaffolding does with the finished building. The city has been trying to avoid the inescapable logic of the situation by denying the premises, written in many past flood warnings, but the experience this



Another View of One of the Threatened Places during the Plood-Water Pight at New Orleans: This Shows the Water at the Foot of Esplanade Avenue, Where a Rise of But a Few Inches would have Flooded the City

#### POPULAR MECHANICS

year finally killed the old "hush-hush" policy, by which the people were lulled into a feeling of false security, and orders have been issued by the levee board, in accordance with the demand of the

Typical New Orleans Wharf, Showing the Usual Manner of Erecting These Structures: Under the Provisions of the New City Ordinance Several Miles of These Wharves will have to be Raised

whole community, to give the city the absolute protection it should have had years ago.

The levee board's orders, as expressed in recent resolutions, give some idea of

the magnitude of the problem:

"All interests located on, crossing through, or over and along, said levees [are] required to arrange their appliances so affected to meet the policy of the board in the premises, the rearrangements necessary being the raising of all dock-board wharves to standard grade,

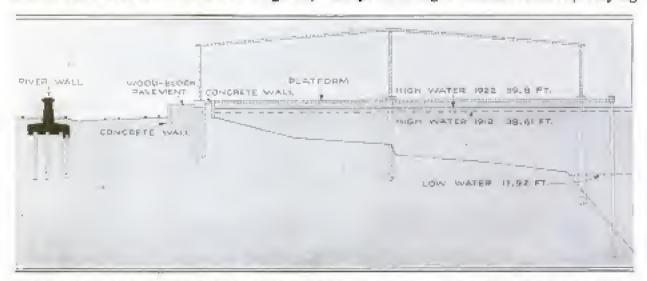
the elevation of the public belt and all other railroad tracks, as well as all intersecting city streets to the same grade, removal of all pipes running through the levees, the raising of all railroad-

crossing inclines and terminals, the closing of all existing gaps in the protection levees, and the removal of any and all objectionable matter and materials from any levees built within this district for the protection of the public in general,"

New Orleans' commercial front is about three miles long. It is in this section that the protection is least adequate. The remaining 23 miles of levee, on both banks of the river, are higher and stronger than those in the region indicated. Wharves in the outlying districts are built at proper grade, and the

strengthening of the levees in these sections is a comparatively simple matter.

The practically unbroken line of wharves on the commercial front extends over the water on the river side, and is built upon earth-filled, concrete-inclosed embankments on the land side, that take the place of the usual type of levee. Because of the height of the river banks, due to overflows of past generations, and a general building-up process, it is necessary to raise the artificial protection here only to a height of 10 to 15 feet, varying



Sketch. Showing the Reinforced-Concrete River Wall Which has been Proposed by the Board of State Engineers of Louisians as a Substitute for Dirt Levees and Embankments along the Commercial Waterfront of New Orleans: The Estimated Cost of the Improvement Is \$1,000,000 a Mile



Behind the Wharves of New Orleans, Showing the Railroad Yards, Loading Platforms, and Industrial Plants Located There: This Illustrates the Magnitude of the Task the City is Obliged to Undertake in Raising the Waterfront with Its Wharves and Transportation Facilities

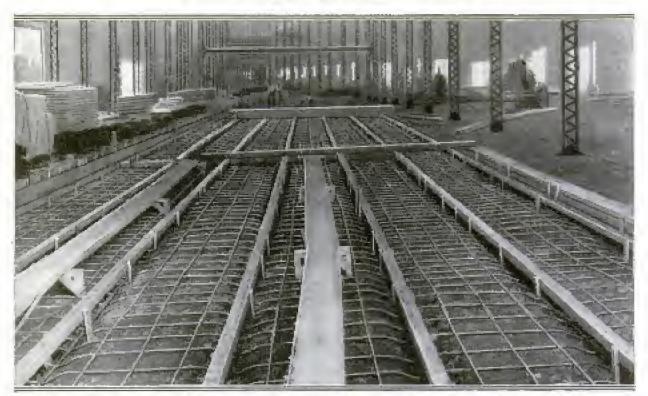
with local conditions, whereas in other river sections, the levees must be 25 feet high. But New Orleans did not go to even this trouble. As a result, several of the wharves this year were under water; the flood was a foot higher than the levees along two miles of the river front, and within a foot of the top for two miles more. Engineers declare that 3 feet is the least margin of safety that should be considered.

Likewise, little effort has been made to build reinforcing embankments to support the levees against the terrible thrust of the flood river. For instance, there was a levee at one place barely 15 feet wide to hold a head of water of 5 feet. A large manufacturing plant was immediately behind it. At another place a box levee less than 15 feet wide held a head of 6 feet of water. The city met the flood crisis by sandbag levees; by improvised piling; by small dirt embankments, protected by tarpaulin, down the center of the wharf sheds; by eleventh-hour strengthening of weak spots up and down the line—weak spots that appeared

as by magic, and some of which were discovered by the merest chance.

The actual raising of the wharf levels will be comparatively simple, from an engineering standpoint, though somewhat costly. The concrete-inclosed embankments will simply have their levels raised to grade height, the iron pillars supporting the sheds will be jacked up, new sills will be laid over the entire wharf area, and the new flooring built. This work will be done gradually, to avoid interrupting the foreign-trade movement. The first wharves to be raised will be those at Robin Street, Celeste Street, Seventh Street, Market Street, Erato Street, and St. Andrew Street.

This work will cost about \$1,000,000. The other wharves will be raised as soon as possible. The section at the foot of Canal Street—which is the "water gate" of the Mississippi Valley—will be raised in connection with the elaborate development work the dock hoard contemplates there. Probably the cost of raising the entire river front will be around \$5,000,000—though this is only a rough estimate.



Interior of One of the Large Wharves at New Orleans, Showing How the Reinforced-Concrete Levee Protection is being Raised for the Purpose of Preventing a Recurrence of the Flood Danger That Caused the State Authorities to Issue Orders for the Raising of the Waterfront

But the building of the embankment or its equivalent presents a more difficult problem because of the railroad tracks and other facilities that now occupy the ground. Two methods of making the cross section of the levee conform to government standards have been suggested: Building an embankment, at least 300 feet wide, with a river-side slope not steeper than 1 in 3, and a city-side slope not steeper than 1 in 10; this embankment would be raised by material dredged from the river, or hauled from inland points; or building a reinforced-concrete river wall behind the wharves and as near to them as conveniently possible. This wall would rest upon creosoted pilings sunk 15 feet into the river bed, to withstand the pressure due to the 20-foot variation in the height of the river; the pilings to be 4 feet apart, and the base of the wall 15 feet wide, and 10 to 15 feet high, according to local conditions.

The advantage of the latter alternative lies in the fact that it would disturb established facilities less than the making of a fill 300 feet wide and rebuilding everything on top. Under proper safeguards, tracks could parallel and cross the river wall. On the other hand, this type of construction has the disadvantage of higher cost, which is estimated at \$1,000,000 a mile.

No decision has yet been reached as

to which method will be adopted. It is, of course, obvious that the river-wall type is ideal, and ultimately this, or something resembling it, will have to be built.

The need of immediate action, however, is empliasized by the facts that, at flood stage, about 2,000,000 cubic feet of water a second pass New Orleans, and that, as measured on the Canal Street gauge, the flood level has jumped from 15.8 feet in 1882 to 22.8 feet in 1922—a rise of 7 feet. According to the city engineer of New Orleans, the trend is toward still higher flood elevations, as proved this year, when the ultimate high-water elevation predicted by the Mississippi River Commission was reached at Vicksburg, Miss., and points below, and the lower river broke all previous high-water records, although the stages reached at Cairo, Ill., at Memphis. Tenn., at Helena, Ark., at Louisville, Ky., and at Cincinnati, Ohio, fell below that record by amounts varying from 1 to 20 feet.

To meet the past and future rise of flood levels, the Federal and state governments have spent something like \$186,000,000 on levees. Many of these are up to standard, but many are not. The remarkable part of the entire situation is that New Orleans, in which is concentrated one-third of the wealth of Louisiana and a fourth of the population, should have been content to drift along with a levee protection of such a

temporary character. With a concrete river wall, the city could meet, economically and quickly, the danger of floods if the water should rise higher than the engineers now think it will, because this type of construction lends itself readily

to emergency work.

With its decision to set its own levees in order, New Orleans has launched a movement that bids fair to become nation-wide, to secure the highest and strongest levees possible for the entire river and such other supplementary relief as may be possible. This relief is to be determined through a survey made by nationally known engineers, who will be employed by a Safe River Organization, the nucleus of which has been formed in the Committee of One Hundsed in New

PAPER AND CARBON SHEETS FED FROM OFFICE DEVICE

Soiled fingers, creased carbon sheets, and smudged letterheads are avoided by the use of a new office appliance which ejects paper and carbon sheets in proper order, ready for insertion in the type-writer.

The machine is a small steel cabinet having compartments for supplies of paper and carbon sheets. By operating a central lever, a fine steel point in each compartment engages the top sheet of its pile and pushes it forward. The sheets appear simultaneously and in order. After typing, the carbon sheets are deposited on a cardboard tray under a hinged cover on the top of the cabinet. When the supply of carbons in a compartment is exhausted, the empty tray is

Above: Diagram, Showing Essential
Paris of the
Machanism,
Right: How
Shorts Appear,
Ready for the
Typewriter

exchanged for the full tray from the top. The capacity of each compartment is about 100 sheets of average weight.

Orleans. This committee is now ganizing the entire Mississippi Valley. If the engineers declare the plans feasible, the additional relief on the lower river will take the form of spillways, or other artificially built outlets into the Gulf and into swamps, through which the surplus water will run when it reaches a certain stage, say, 18 feet on the Canal Street gauge at New Orleans. Such outlets above and below New Orleans would prevent the water from rising to dangerous levels. After this year's levee breakages the river dropped 2 feet in a few days. But it is recognized that these preventive **t** measures cannot be put into effect for several years; and in the meantime, New Orleans is building levee bulwarks equal to those in other sections of the country.

ATMOSPHERIC PRESSURE USED IN NEW DISHWASHER

Utilizing the atmospheric pressure is the principle employed in the operation of a new portable dishwasher which



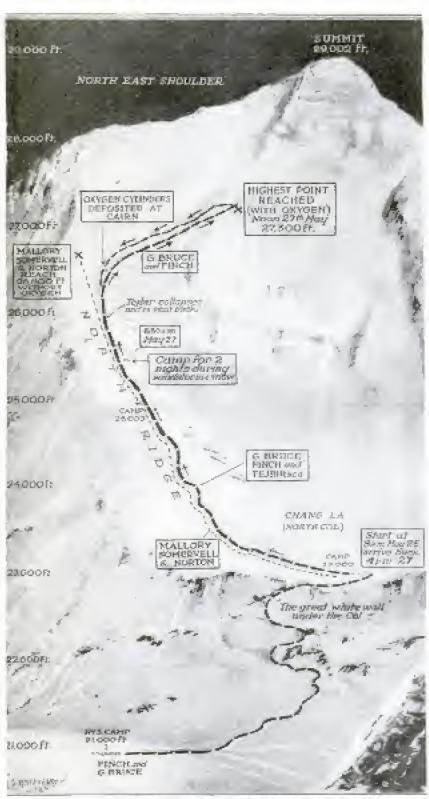
sterilizes and dries the dishes in 10 minutes. The only moving part inside the machine is a small suction fan that creates a vacuum at the top of the tank above the water. This causes air to rush in at the bottom and up through the water, agitating it so as to speed the washing process. The fan is driven by an electric motor, mounted outside of the outfit and connected by an extension cord to any light socket or base plug.

rtlandf St. Copyrighted material

MOUNT EVEREST SUMMIT STILL UNTROD BY MAN

BY HENRY S. WHITE 0.10 our

bers of the Mount Everest expedition, at HE highest point above sea level ever noon, the 27th of last May. This brought reached by a human being afoot-



CONTRIGHT OF THE DEPTED SCOTES OF THE SPHERE, LOWBOW Notated Diagram Divided into 1,000-Foot Sections, Showing the Route Taken by Two Parties up the North Face of Mount Everest in Their Attempt to Reach the Summit of the Peak

27,300 feet—was attained, with the aid of oxygen-breathing apparatus, by two mem-

feet of the summit, the highest point on the earth's surface. The final attempt was to have been made June 6, but the monsoon broke June 3, definitely frustrating any further efforts for this year at least. When the monsoon breaks on Mount Everest, there is no alternative but to get off the mountain as soon as possible. It has now been def-

the explorers within 1,702

initely proved that the mountain itself at the highest points reached is not difficult to climb, and the two explorers who came so near to reaching the actual summit were able to proceed along the north face without ropes. The one and only obstacle that made the summit unattainable was the bad weather, and with the monsoon left out, it is certain that the summit will be reached at the next attempt.

An altitude of 26,800 feet was reached without any oxygen. The oxygen apparatus consisted of four specially light oxygen cylinders similar to those used by airmen. These are carried on the back and the oxygen is piped to a box respirator that fits over the mouth and nose. Some idea of the rarefied condition of the air may be conveyed hy a comparison of the barometric pressures at sea level and at the summit of Everest, the former being about 30 inches, according to the temperature, and the latter being only 10.6 inches. At this altitude the average temperature

is about 25 degrees below zero, another indication of what the explorers had to



The Baggage Connected with the Mount Everest Expedition Packed Ready for Transportation by 50 Coolies and 350 Yaks, the Central Asian Beast of Burden

contend with. The two explorers who reached this highest point were Capt. Geoffrey Bruce, one of the leaders of the expedition, and George Finch, a scientist attached to it.

By careful organization, and after continued coöperation of all members of the expedition, the indomitable pluck of the two highest climbers brought up the record at one bound from 24,000 to 27,300 feet, and this in spite of the fact that, when carrying the oxygen apparatus, the load of each of the explorers at the start weighed 28 pounds. Such an effort would have been impossible without the aid of the oxygen, but even so, reports show that the climbers suffered actual torture from the rarefied atmosphere, the cold mists, and the biting winds. The comfort of a really hot drink was denied them for the simple reason that at that altitude water boils at about 170 degrees,

Much of the success of the expedition depended upon the exertions of the coolies who acted as porters. These were native Sherpas from the southern face of the Himalayan range, and Tibetans from the northern face. Although virtually untrained to snow and ice, they carried loads up to an altitude of 25,500 feet, some actually making four trips a day, and one beating all records by carrying a load of 40 pounds in spite of the rarefied atmosphere. All this was done by them without a murmur or a complaint of hard work.



The Two Members of the Everest Expedition Equipped with the Oxygen-Breathing Apparatus That Enabled Them to Reach an Altitude of 27,300 Feet

The three members of the expedition who reached 26,800 feet were Messrs. Mallory, Somervell, and Norton.

Tide World Photos

POPULAR MECHANICS

herrical age

### ELABORATE COFFIN PROVIDED FOR JAPANESE DIGNITARY

376

Extremely elaborate coffins are used for the burial of Japanese dignitaries, the one provided for the late Marquis Okuma be-



Elaborate Casket Which was Used for the Burial Services of the Late Mar-quis Okuma, at Hibiya Park, Tokyo

ing representative of the type. Resembling a small fantastic pagoda, highly ornamented with scrollwork, the coffin was carried on a motor truck to Hibiya Park, Tokyo, where a public funeral service was held, according to Japanese custom.

# SIMPLE PROCESS FOR MAKING SULPHURIC ACID

One of the greatest sources of initial expense and costly upkeep, are the leadlined chambers necessary in the manufac-

ture of sulphuric acid by the contact process. Many attempts have been made to work out a process for making this essential acid without the use of the lead chambers, but none of these has proved successful. Now, a patent has been granted for a process in which the sulphur-dioxide gases are brought into intimate contact with a large amount of nitrosyl acid, of determined strength, present in a finely divided state. The chambers in which the sulphur-dioxide gases. are mixed with the nitrosyl acid may be arranged separately, in parallel, or in series. The process is,

to a great extent, regenerative, it being only necessary to denitrate daily an amount of nitrosyl acid equal to the daily production of sulphuric acid. The complete plant is very simple and requires

only limited space.

#### سعاره وفاران فرادر (م 从地位 WATER-DRAWING GEAR RELIC OF ANCIENT DAYS

Primitive wells may still be found in everyday use in China. An interesting example is that shown in the accompanying illustration. The well gear, constructed by the great - great - grandfather of the present owner, consists of a slender tree trunk supported by two crudely built tripods and running through a drum which serves as a wheel for the rope by which the water is drawn. The well, about 25 feet deep, is cased from top to bottom with sandstone. Any improvement of the gear would be considered disrespectful to the original builder.



This Well Is Still in Everyday Use in China. The Owner is Shown Raising the Pall with the Same Apparatus His Forefathers Used Several Generations Ago

C. Plevender 1208 7. Copyrainted material Philadelphia.



This Shows Excavation and Construction Work Progressing on the Outfall Portion of the Main Sewer, Where It Empties into the Kansas River, and Gives Some Idea of Its Immense Size

## KANSAS CITY BUILDING WORLD'S LARGEST SEWER

By GEORGE F. PAUL POT Che wertly Bld. Turkey THE Turkey Creek Sewer, which is western portion of Kansas City. Turkey Creek itself is a very crooked stream and

clared to be the largest ever constructed on this continent or abroad. The great size of the main section can be judged from the fact that there are twin boxes, each 17 feet in width and 18 feet in height, containing 13.5 cubic yards of concrete and 1,975 pounds of steel per lineal foot. It will discharge approximately 1,000,000 gallons every minute.

This sewer, which will involve a total expenditure of more than \$2,000,-000, has been planned to protect vast terminals and great industries flood waters. In months past the Kansas River and Turkey Creek have combined to threaten the



This Gives an Idea of the Amount of Bracing That Was Necessary in Places Where the Channel Passed through Soft or Swelling Ground, as a Proper Foundation could Not be Found Even below Hardpan

has a gradient of 40 feet per mile. When a cloudburst or heavy rains start it on a rampage, it rushes down with overwhelming force. After it reaches Rosedale, it proper foundation could not be found for a depth of 17 feet. Piling was resorted to, and after the piles had been placed in leads, an ordinary steam hammer was al-



View Looking down the Main Concrete-Lined Twin-Box Sewer: This was Taken at a Point Where It Passes under No Less than 15 Railroad Tracks

is obstructed by many railroad trestles and bridges that cause it to leave its channel and tie up traffic and shut down industries. Water has been known under some circumstances to rise to a height of 16 feet at 28th Street and Southwest Boulevard.

Many construction difficulties have been encountered in pushing this work. While building a portion of the 7-foot section lying in the old bed of Turkey Creek, a lowed to rest on the pile, but the weight alone caused a penetration of 17 feet without a blow being struck. The piling was then driven through 3 feet of hardpan to solid rock, but the subgrade was too soft to allow steel to be placed, and certainly it was too weak to support a concrete footing. A lumber grillage helped to solve this difficulty.

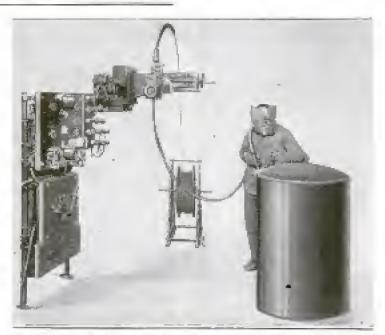
The main sewer, in traversing its total distance of more than 8,000 feet, intersects and crosses 36 railroad tracks. In the case of main-line tracks that had to be kept in use, 60-foot piles

were first driven on a line with the outer dimensions of the sewer. These were capped, and three 24-inch I-beams, 60 feet long, were bolted together and placed under each rail. As the excavation proceeded downward, it was necessary to use many piles.

New difficulties have been encountered at almost every turn, yet the work has been pushed vigorously, and should be completed within a few months.

# ELECTRIC-ARC WELDER IS EQUIPPED WITH QUIP AUTOMATIC FEED

Welding operations on objects having an irregularity of shape or seam contour, and also on those 👊 unusual bulk, may be efficiently accomplished by the use of a new electric-arc welder which has an automatic feed. The metal electrode, or wire, which melted into the seam is fed through a tool in the hands of the operator, the speed of the wire being controlled by a small electric motor. This motor, in turn, is regulated by the voltage across the arc at the welding point, thus assuring a constant and correct feeding of the electrade from the coil on the reel to the operator's hand.



Electric Arc-Welding Outfit, Showing the Automatic-Peeding Apparatus Projecting from the Top of the Control Panel, While the Reel of Electrode is Seen Below

9701 Carl L. W. Fedrose, 1453 W. 54 ch &

POPULAR MECHANICS COURS (1) each 378

This Shows the Simple Process of Preserving the Excess of the Strawberry Crop. The Berries are Mixed with Sugar in Proportion of Two Pounds to One, and are Packed in Casks

# PROCESSING SAVES OVERFLOW OF BERRY CROP 96/0

Through the recent discovery of a practical method of preserving fresh strawberries and other soft fruits, berry growers of the Northwest this year saved the overflow from the retail markets, worth millions of dollars, which heretofore had been lost every season. In previous years, if the berry growers produced more than the retail market and the canneries could absorb, they either took for part of the crop whatever prices were offered them—usually not more than enough to pay for the crates—or let the berries dry on the vines.

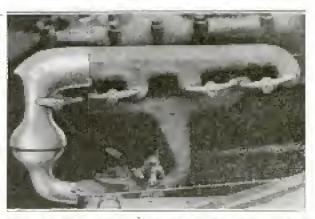
After suffering severe losses last year, the growers decided to provide a safety valve for their market by devising a method of preserving the fresh fruit, which can be utilized in this country and abroad as fresh-fruit coverings for ice cream.

The new method is very simple. It consists merely of packing the berries in sugar in the proportions of 1 pound of sugar to 2 pounds of berries. Casks of wood holding 500 pounds are used for packing. If for export to foreign countries, the casks are given a thick coating of wax inside, or are lined with porcelain. After the heads are put on the casks, the berries are placed in cold storage and will keep in a fresh state indefinitely.

north Parise Cooperative Vary Isrhers, Pres ? Wash.

### AIR-CLEANSING DUST TRAP FOR AUTO CARBURETORS

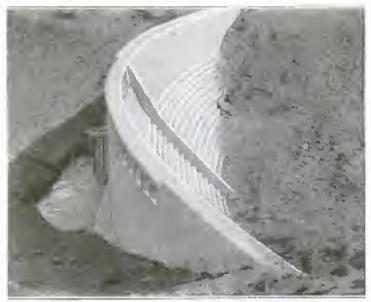
If the air in the vicinity of an automobile carburetor is permeated to any extent with dust or dirt, this will certainly be sucked into the motor cylinders, where it may do considerable damage. A dust trap for use on a popular-priced car takes the place of the hot-air pipe that connects the carburetor with the exhaust mani-



Dust Trap for Use in Place of Regular Hot-Air Pipe That Connects the Exhaust Manifold with the Carburetor on a Popular-Priced Light Automobile

fold. Above the carburetor a bulbshaped enlargement of the pipe contains a special composition that traps the dust and prevents it from reaching the carburetor.

and prevents it from reaching the carburetor. Identy auto Part Co 9706 Cali rina Zoological Society 380 POPULAR MECHANICS Hirt



One of the Dams Constructed by the San Diego Zoological Society for the Double Purpose of Displaying Wild Life in Water and the Type of Barrage Used to Impound the City's Water Supply

### ZOÖLOGICAL SOCIETY'S DAMS SÉRVE DUAL PURPOSE

Miniature dams built by the Diego, Calif., Zoological Society, served in a dual capacity recently, when they were dis-played to the public. The society has constructed outdoor pools in which are kept seals, alligators, birds, and other animals. The tiny dams required to impound the water, were made in exact replica of the huge structures in the neighboring mounfrom which the city's supply of water is drawn, thus demonstrating the construction of the water-supply dams as well as providing other education in the form of wild life in the water.

# 4663 TWO CLOUDBURSTS IN A WEEK AT SYRACUSE

Although in the past the city of Syracuse, N. Y., had never experienced anything in the nature of a cloudburst, recently not only one occurred there, but

at the junction of Furnace Brook and Onondaga Creek where a street runs parallel with the latter and crosses the former on a concrete bridge. The banks

of the creek were lined with reinforced-concrete walls. After destroying the bridge, the torrent of water tore away the street, until it underminor the wall of the creek, of which it cut off a huge section, that was rolled over and deposited,: apside down, across the channel.



Pare of the Wreckage Caused by the Birst Cloudburst That Syracuse, New York, Ever Ex-perienced and Which was Fol-lowed in a Week by a Second

203 & leavered L

Ind. a. a. Waters

actually two in less than a week. Being entirely unprepared for such an emergency, the city suffered a great deal of The most redamage. markable of the results of the destructiveness of the cloudbursts occurred



This View, Taken after the Second Cloudburst, Illustrates the Havoc Wrought by the Water; Houses, Bridges, and Tunnels being Destroyed. Part of the Walls of the Creek was Carried Across the Channel

9485 Federal motor Truck Co

This Moving Van Displays on Each Side an Etaborate and Artistic Painting of an Historic Incident. One Side Shows the Crossing of the Delaware and the Other Side the American Eagle on a Field of Draped American Flags

# MOVING VAN PATRIOTICALLY AND SKILLFULLY ADORNED

Decorated in a manner that certainly cannot fail to attract the attention of the public, a motor truck used as a moving van has recently made its appearance in Buffalo, N. Y. Each side of the van is entirely covered with a framed painting, elaborately and artistically depicting a patriotic subject. One, entitled "The Dawn of Freedom," is a reproduction of the well-known picture of George Washington crossing the Delaware. On the other side a picture, called "Pride of the Nation," portrays an American eagle with widespread wings across the front of two star-spangled banners, and standing upon a shield hearing the American coat of arms.

### JAPANESE MAKES NEW PAPER THAT CAN BE WASHED

Many possible uses suggest themselves for a special paper recently produced and patented by a Japanese inventor. The paper is remarkably strong and can be crumpled up and washed with soap and water, much as one would wash clothes. So durable is this paper that it can be used as a covering for umbrellas, and when soiled, can be easily cleaned at home. As a wrapping paper, it could be used over and over, being washed when

soiled. No special precautions are necessary in washing, and the paper is dried in the usual manner. It is said that the



This Japanese Paper Is Waterproof and can be Crampled Up and Washed with Soap and Water

product can be made at a very reasonable price. It has a texture somewhat like cloth, and is not to be confused with oiled paper.

Thys, Japan Tidamachi, Lepan

international newsreel Corp.

#### BURN "MOUNTAIN OF BARRELS" AT BOSTON CELEBRATION

Fifty thousand persons witnessed a monster bonfire in Boston on July 4, when a "mountain of barrels," more than



"Mountain of Barrels" Which was Burned to Celebrare July Fourth in Boston, as It Appeared Shortly Before the Torch was Applied

100 feet high, built in 30 tiers, and containing just 3,500 harrels, was sent up in smoke and flame as part of the Fourth-of-July celebration.

The "mountain" was built up in a remote part of the city, and no damage of any kind resulted from the fire. It is proposed to hold a similar event next year.

# UNUSUAL METHOD OF LAYING SUBMARINE CABLE

Recently, when laying seven submarine cables under the Harlem River in New York, unusual methods were adopted to meet the special conditions encountered. The cables were each 700 feet long and were laid beneath the Park Avenue drawbridge. Because of the center pier of the bridge, it was not advisable to lay the cables from a barge in the usual way. It was decided, therefore, to pull the cables

across the river by placing the reels on one side and a hauling winch on the other side of the river. A hauling cable was run across the river and threaded between the piling supporting the center of the drawbridge. The cable reels were jacked up, and the engine on the opposite bank hauled the free end of the cable across, each cable being hauled separately. Special precautions were taken to seal the free ends of the cables.

### PEACHES RESEMBLE PUMPKINS ON OHIO FRUIT FARM

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Among the strange varieties of fruit grown by an Ohio orchardist who makes a hobby of grafting, are garden huckle-berries which are as large as small grapes, peaches that look like small yellow pumpkins, and strawberries thriving on raspherry bushes.

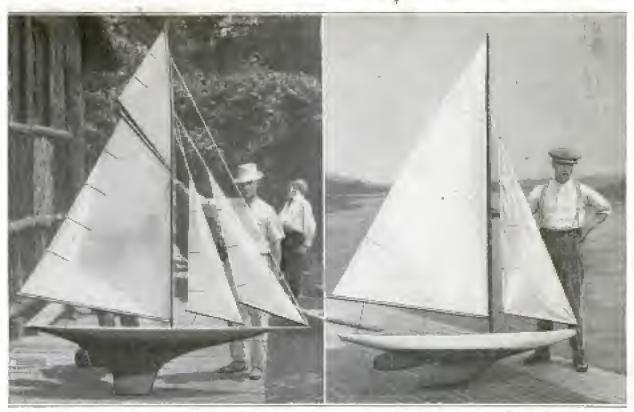
# HANDY OUTFIT FOR VENDING ICE-CREAM SANDWICHES

For use at fairs and carnivals, a portable outfit has been made for dispensing ice-cream sandwiches, the vender strapping it about his shoulders and circulating where the crowds are thickest. In the center of a metal case is an insulated icing chamber with a capacity of a half gallon of ice cream. A compartment at one side holds 150 of the small sugar wafers used in making the sandwiches,



and the forming machine is held upright in one corner of the case. All parts of the outfit are removable for cleansing.

dry seorge of Hess William Olendonnatorial



Left: Model Yacht "Polka Dot" and Its Owner, E. A. Bull of the Prospect Park Yacht Club, Brooklyn. Right: The "Endeavor" and Its Owner, W. J. Daniels of London, England, Which Sailed and Lost a Series of Three Races against the American Craft

### AMERICAN MODEL YACHT WINS IN INTERNATIONAL RACE

The international model-yacht race for a cup offered by the magazine Yachting, sailed in three matches at Bayside, L. I., was easily won by the American yacht "Polka Dot." The model is full sloop-rigged, with a sail area of 3,000 square inches. It is 47 inches long, and weighs 34 pounds. Its only rival was an English model called "Endeavor," Marconi-rigged, with a sail area of 2,700 square inches, measuring 52 inches in length, and weighing 44½ pounds. The course in each race was 3 miles long, sailed in different directions, and the best time made by the winner was 1 hour 33 minutes 22 seconds, nearly 10 minutes better than the English boat.

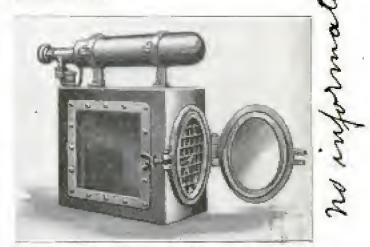
### RESUME WORK ON ELEVATOR TO TOP OF MONT BLANC

Work, halted by the war, has been resumed on an aerial cableway which will run from Chamonix, France, to the summit of Aiguille du Midi, some 3,000 feet lower than Mont Blanc. Eighty passengers will be carried by the cableway. Instead of a difficult journey of from 13 to 14 hours afoot, the tourist will now have a brief comfortable ride.

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# 7 3 FOR MINE-RESCUE BIRDS

Because the canary bird is easily overcome by the poisonous gases found in coal mines, one of them is carried into the workings by mine-rescue crews to indicate the presence of dangerous gas. The cage used for carrying the little bird is equipped with a glass door and an oxygen tank. When deadly gas is encountered and the canary is overcome by it, instead of being allowed to die, the door is closed and oxygen is administered until it revives.



This Cage, Used for Carrying Canaries Employed in Mine-Rescue Work, is Equipped with an Air-Tight Glass Door and Oxegen Tank

Box 40, Canada

# DEEPEST ROCK EXCAVATION FOR NEW YORK STORE

BY T. BENJAMIN FAUCETT 492

EXCAVATION operations in New York offer a variety of obstacles seldom found in any other city. In the



New York's Deepest Solid-Rock Building Excavation: It Goes to a Depth of 42 Feet. An Addition to a Large Store will be Erected Here

cañon of Broadway, quicksand requires that these structures be anchored upon concrete. The Woolworth Building foundation is sunk through 115 feet of quicksand to bedrock and consists of 69 reinforced-concrete piers. Within three blocks a new municipal-court building is under construction. Here the excavation contractors found themselves up against the problem of an underground stream that ebbed and flowed with the tide of near-by East River. By the use of many high-power pumps and caissons, the concrete piers were sunk to bedrock in a manner resembling that of bridge construction.

But Manhattan Island gradually loses its "soup soil" with every block toward the north, and before reaching 34th Street, it consists of solid rock that may reach hundreds of feet below the surface. Still farther north, and especially in University Heights, the rocky outcrops resemble miniature mountains that must be blasted away before even the shallow excavations for houses and apartments can be made. Here the caissons of the downtown section are superseded by the steel drill and dynamite. New York's deepest foundation through solid rock is for an addition to one of the city's largest department stores. Thousands of persons daily stop and marvel at the prodigious job of blasting out a 42-foot

depth in the 100-foot front extending from 33rd to 34th Street, between Sixth and Seventh avenues. And they have plenty of time to observe every detail of the work. as the removal of this huge "underground mountain" will require almost four months of constant effort. After about a month of work only a deep crevice had been blasted in the unvielding rock. The shovel hasn't picked up a handful of soil since it began work in this unwelcome quarry, broken rock and heavy gravel forming the loads that the derricks hoist to the trucks above, while the workmen at the 42-foot level



Raising the Wire-Cable Matting after a Blast: Under It Is Another Mat of Two-Inch Rope, and at the Sides Heavy Log Buffers

downtown section, where the tallest buildings in the world make a narrow look like pigmies laboring in a giant

Sardinia House King way Londing W.C. 2, Bardinia House King way Londing Will 2,

Just a little over five blocks distant, on West 39th Street, near Fifth Avenue, another foundation has been blasted out of the solid rock, but its depth is only a trifle more than half that of the 34th Street excavation. Several other smaller excavations are being made in the immediate neighborhood, and the air has been thick with the pungent dust that arises after

every blast. The explosions are muffled by a heavy matting of 2-inch hemp rope, over which is placed another matting of 1-inch steel cable, while the sides are protected by log buffers. The largest pieces of blast rock are broken into suitable sizes by dropping a 1-ton iron ball from the derrick arm. This rock can be used in foundations of smaller buildings.

## NOVEL ASH-REMOVAL SYSTEM FOR POWER PLANT

It was found difficult to remove by normal methods the ashes from the boiler house of an electric generating plant at Bedford, Eng., so the engineers decided to utilize the condenser discharge to assist in this removal. The condensers discharge water to a reservoir under the stoking floor, and this reservoir discharges flushes of about 5,000 gallons by means of a swinging weir. A duct leads beneath the road beside the plant to a sump. The ashes are dumped into the water duct and thus conveyed to the sump, where the water is filtered and returned to the river. The ashes remain in the sump, and are periodically removed by a grab\_crane,

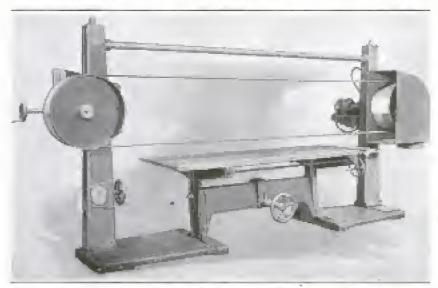


Sump beside a Road, on the Other Side of Which Is an Ricciric Generating Plant: The Ashes from the Boilers are Removed by Dumping Them into a Duct That Carries Them to This Sump

### MOTOR-DRIVEN BELT SANDER OF NOVEL CONSTRUCTION

Self-contained in every respect, a new motor-driven belt sander consists of two pulleys that drive a horizontal belt and are mounted in ball bearings upon upright stands connected to a base that supports a table beneath the belt. Directly connected to the driving pulley is an

electric motor. Each pulley has a vertical adjustment of 48 inches, and the idler can be adjusted to take up slack in the The table has a belt. vertical adjustment of 14 inches, a horizontal travel of 36 inches, and runs on ball bearings. It is 96 inches long and 32 inches wide, constructed of planed wood strips with gaps between them to allow the dust to fall through, thus keeping the table clean. The machine is designed for sanding rapidly all kinds of woodwork, and can also be used for polishing metal surfaces



Motor-Driven Belt Sander with Belt About 31 Feet Long and with a Vertical Adjustment on the Pulley Brackets of 48 Inches: The Table Travels Horizontally 36 Inches, and Adjusts Vertically 14 Inches

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Grand Rapide herel

Westinghouse Electric . If Frank Hotton
386 Popfillar MECHANICS + Con Electric

HAS RHEOSTAT CONTROL

Persons doing extensive work with a gluepot will appreciate the development



of an electric pot which is fitted with a sheostat control. The appliance need not be affected by changing room temperatures, climatic conditions. different grades of glae, or various kinds of work, as the

rheostat is easily adjusted to meet any changes, thus continually supplying the contents with a uniform heat,

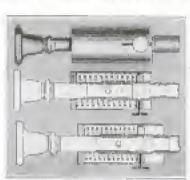
# COMPACT AUTOMATIC MACHINE

Hairpins are made very rapidly and cutirely automatically with a motor-driven machine that is only about 6 feet long, 30 inches wide, and 20 inches high. The hairpin wire is first fed through straightening rollers to a die that splits the wire so as to form sets of six small diamond-shaped loops. Then the wire is cut off at points between these sets of loops, and each of

the lengths is bent U-shaped, leaving three of the loops on each prong of the "U." The points are then sharpened, and each "U" is a hairpin. They are then dipped in a cleansing solution, enameled, and baked in a temperature of about 350° F., when they are ready for use.

# NO-PRESSURE ATTACHMENT

The inexpert cornet player is likely to put so much lip pressure on the mouth-



piece, particularly in trying to get a high note, that the lips are hurt and strained. To make this impossible and to train the beginner to avoid this excessive pressure, an

attachment has been constructed that is placed between the cornet and the mouth-piece. Inside a small cylinder, which is connected to the tube of the mouthpiece, is a coiled spring that, by compressing, absorbs any excessive pressure, and at the same time allows the tube of the mouthpiece to slide into the cornet until a hole in the former registers with a hole in the latter, causing a discord that warns the player to relieve the pressure.



Motor-Driven Automatic Hairpin-Making Machine That Runs About 80 Revolutions a Minute, Each Revolution Making a Finished Pin Ready for Enameling: The Hairpin Wire is Split and Formed into Loope on a Die, and There Are Tools and Bending Fixtures for Cutting and Bending the Pins

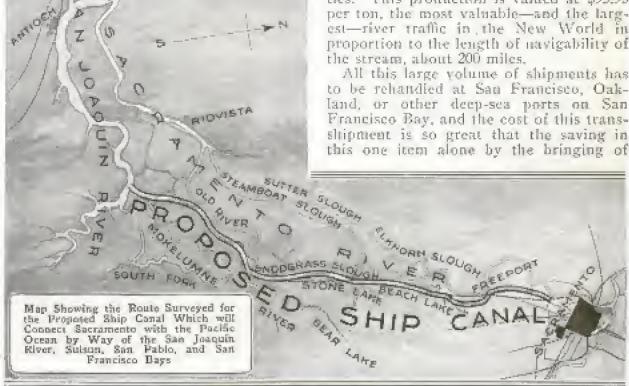
The Channed Hair Pin Co.



SURVEYS have been completed, and a report is being prepared for presentation to the Federal government for another of the world's large ship canals, to be located in California, and to connect Sacramento, the capital of that state, with the Pacific Ocean, by way of San The canal will be 35 Francisco Bay.

miles long, 150 feet wide at the bottom, 350 to 360 feet wide at the surface of the water, and 30 feet deep, capable of floating all but the very largest of deep-sea vessels, and is designed to convert Sacramento, which is 90 miles from the Pacific, into an ocean port. Out of Sacramento, on steamboats, barges, and schooners, are shipped every year 1,000,000 tons of products of the grain ranches, fruit orchards, vegetable farms, and mines of 29 counties. This production is valued at \$95,95 per ton, the most valuable-and the largest-river traffic in the New World in proportion to the length of navigability of

All this large volume of shipments has to be rehandled at San Francisco, Oakland, or other deep-sea ports on San Francisco Bay, and the cost of this transshipment is so great that the saving in



deep-sea tonnage direct to the Sacramento wharves will pay the cost of the ship canal in about 10 years. In addition to this, the deep channel, with the silt-bearing waters of many streams cut off, will eliminate the present expensive dredging of the channel of the Sacramento River, which has to be kept up continuously the year around. There are 3,000,000 acres of arable land, suitable for cultivation and available for irrigation, in the Sacramento Valley, tributary to the river and the city of Sacramento. Of this great area, only about 25,000 to 30,000 acres are in production. It is believed that the introduction of deep-sea shipping to the heart of this valley will bring about the early cultivation of these other acres. How much arable land lies idle in the remaining counties tributary, by rail and water, to Sacramento it is impossible to estimate, but it must be nearly as large as that in the immediate valley of the Sacramento River.

For 55 miles of the 90 which separate Sacramento from the Pacific Ocean, there is deep water—from 40 to 80 feet—so that only 35 miles of the canal need be excavated, and these through soft delta land, with no complicated engineering problems, and no difficulties to overcome other than the walling out of the silt-bearing streams, and the establishment of crossings for railroads and highways. Under direction of the ship-canal committee of the Sacramento Chamber of Commerce, which is the prime mover in the plan, a complete survey has been made of the canal route, and cost estimates have been made for presentation to

the national government, in an effort to obtain Federal aid. If, for any reason, such aid is not forthcoming, the city of Sacramento and the 29 tributary counties, will proceed with the construction of the canal, which will be publicly owned and operated, as will also the large turning basin and the port facilities to be established at the Sacramento end,

The cost of excavation is estimated at \$825,000 to \$1,000,000, the comparatively low cost being due to the soft earth to be moved and the absence of stone from the course selected. Much of this course lies through sloughs and bayons, which in some places will have to be deepened, in others widened, and in some left virtually as they are today. The waterfront facili-ties, including the turning basin on the San Francisco waterfront, will cost from \$1,000,000 to \$1,500,000, depending on the prices of labor and materials. The proponents of the plan believe that the maximum figure for total cost will be within \$3,000,000, a comparatively insignificant sum considering the economies gained in the handling of freight and climination of the dredging of the channels.

The route of the new canal, which is longer than the Welland Canal, as long as the famous Manchester Ship Canal, and wider and deeper than either, will not follow the course of the Sacramento River, which is maintained at a minimum depth of seven feet for barge and shallow-steamer traffic, but runs for two-thirds of its length south from the eity of Sacramento, and then turns west of south, through Georgiana Slough and into the wider and deeper San Joaquin River a



Sacramento River Bottoms, Showing Some of the Rich Fertile Lands Which could be Essily Cultivated So as to Produce a Great Many Shiploads of Fruit, Grain, and Vegetables for Shipment on the Proposed Canal



River-Front Scene at Sacramento, Showing Several Barges Loaded with Grain, and Illustrating the Enormous Quantity of This Commodity Which is Handled Every Year at This Point, Coming down the River from the Interior

short distance above Antioch, which, incidentally, also will become an important deep-water port for the San Joaquin Valley when the canal is completed. route was selected as the best after an exhaustive survey of several proposed routes. It will start at the southern part of Sacramento city, follow substantially the line of the city drainage canal to Snodgrass Slough, thence down the latter channel to a point near its junction with the Mokelumne River. will cut through to Georgiana Slough. At this point, the natural channel will be abandoned, and a straight cut made into the deeper waters of the San Joaquin The low-water depth of the San Joaquin at the proposed point of entry is 31 feet, and all the way down to Antioch this depth is maintained as a minimum. though much of the water is 60 to 80 feet deep. The depth off Antioch is 54 feet, but a short distance below this place the river divides into several channels which shoal, in places, to a depth of only 18 feet.

The canal is to be constructed in five sections of varying lengths, which can be easily identified by a glance at the map. These sections are outlined by the engineers as follows:

Sacramento to Snodgrass Slough, 17

miles; in Snodgrass Slough, 5 miles; cut to Georgiana Slough, immediately to the south of Snodgrass Slough, 2 miles; in Georgiana Slough, 9 miles; and the last cut direct to the deep water of San Joaquin River, 2 miles, a total of 35 miles. Of this, at least 14 miles are in river and slough channels which already are in use by river craft, and will require only so much excavating as may be necessary to straighten bends and to increase the depth to 30 feet. The other 21 miles will be in original excavation, but in soft earth, the surface elevation of which varies from about 5 feet below to 10 feet above mean tide level, and, in several places, is some feet below sea level,

Investigation by the ship-canal committee shows that the large majority of ports of the world are not accessible to vessels drawing more than 30 feet of water, and that considerably more than half these ports offer only 27 feet of water. The record of bottoms entering and leaving San Francisco Bay shows that 45 per cent of the deep-sea traffic to and from that port is borne in vessels of 20-foot draft or less, and that 80 per cent of it is carried in ships that draw not more than 25 feet of water. Thus it appears that a ship canal offering 30 feet of water

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#### POPULAR MECHANICS

would be able to handle more than fourfifths of the traffic which now comes and goes to and from San Francisco.

The plan adopted for the new ship canal provides that no waters shall be admitted to the canal from either the Mokelumne or the Sacramento rivers, except through gates that will prevent the ingress of sand silt or debris. To so exclude the sands and silts of these streams, locks will be required at the head of Georgiana Slough; otherwise, the canal will be at tide level. Protective works also will have to be constructed at the point of entry of the canal into the San Joaquin River, and estimates of these have been included in the figures of the cost of the completed waterway.

The Sacramento Ship Canal will compare with the other great canals of the world, as follows, according to a table prepared by the state engineers:

Canal,	Length	Width	Width	Depth
4.	in Miles.	in Feet.	in Feet.	in Feet.
Panama	40	.350-650	500-1,000	40-50
Sucz	1.00	105	254	36
Manchester	35.5	104	2.20	2.8
North Sea	60	164	394	32
Kaiser Willer	len 61	244	361 -	35
Welland	77	1.50	260	25
Sacramento	35	1.540	\$50-360	30

Traffic this year on the waterways which will, in part, he replaced by the ship canal, will total approximately \$100,-000,000 in value and will considerably exceed 1,000,000 tons in volume. The growth of this traffic in the past decade has been enormous, since it amounted, in 1910, to only 400,000 tons. When the canal is completed, it is estimated that this traffic, both in volume and in value, will be increased by at least one-third.

# MYSTERIOUS FLOATING FORT OPENED TO VISITORS

One of the mammoth British naval floating forts that have been the subject of so much mystery before and since the completion of the first one, and from which the mystery of their real purpose has never yet been dispelled, is now located at Shoreham on the south coast of England. Recently it was towed to Southwick, a neighboring seaside resort, where it was thrown open to visitors, who were allowed to climb to its upper tower, about 170 feet above sea level, whence they had a bird's-eye view of the whole structure. The mammoth mystery



Left: View Looking Down from the Top of the Tower to the Huge Concrete Base, 170 Feet Below. Center: Visitors Enjoying the View from the Observation Tower. Right: The Mystery Tower as It Appears at Southwick on the South Coast of England

The French of Trailer Co.

9687 POPULAR MECHANICS mil.



This Huge Passenger-Carrying Motor Bus Provides Accommodations for 135 Persons. The Power Plant and Body Are Separate Units: When the Passenger Body is Detached, It Rosts on Polding Legs, and the Power Plant can be Used with a Truck Body

#### LARGE-CAPACITY MOTOR BUS HAS DETACHABLE BODY

The size of passenger-carrying motor busses has continued to increase until now there has been placed in operation in Detroit, Mich., a bus that has a capacity of no less than 135 passengers. The power plant and body of this huge vehicle are separate units, and when the passenger body is not in use, the power unit may be used with a truck body. The former is designed along the lines of a street car, and is supplied with folding legs at the forward end, on which it rests when detached from the power unit. Only one man is required for the running of the bus, and the doors are operated by compressed air. The gasoline consumption is claimed to be only slightly greater than that of the smaller busses seating only 28 passengers.

# busses scating only 28 passengers. FROST IN OXYGEN CYLINDERS PREVENTED BY HEATERS

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In the oxygen cylinders used in connection with oxyacetylene-welding torches, the great amount of expansion that takes place in the reduction valves lowers the temperature of the gas to such a degree that the moisture in it often freezes and clogs up the ports of the valve. To prevent this, electric heaters are now being used on the reduction valves at several places on the Pacific coast. An ordinary reflecting electric heater is wired beside

the reduction valve, and is kept in operation while the oxygen is being used. Besides the prevention of frost, a natural



Battery of Oxygen Cylinders in an Oxyacetylene-Welding Outfit, with Electric Heaters Mounted beside the Reduction Valves

result is a slight increase of pressure in the service line.

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POPULAR MECHANICS Chlahong City

## SCALE AND METER MEASURE ICE IN REFRIGERATOR

Automatically indicating the quantity of ice in the box, and also registering the amount consumed in any given period, are features incorporated in a refrigerator

Leit: Refrigerator Closed, Showing Water Bottle, Scale, and Meter on the Top. Right: Door Opened, Displaying the Ice Scale in the Upper Compartment and Usual Complement of Shelves in the Lower

produced by an Okla-homa man. The innovation appears not unlike ordinary style of container except that the scale and meter are mounted in plain view on the top. When ice is placed in the chamber, the scale is operated like the common spring type, while the meter is actuated from the scale shaft by means of gears. Thus the householder can learn the weight of the ice in the box without opening the door, and also has a record of the total number of pounds that have been used. A water bottle and cooling coils are also incorporated in the refrigerator.

# 166 FLOATING HOSPITAL TREATS

For treating injuries to the feet of boatmen, dock workers, and bathers, a

### EXHIBIT SCIENTIFIC TRUTHS FOR BENEFIT OF PUBLIC

Educational and interesting sights will be witnessed in a magnificent building

soon to be creeted in Washington, D. C., for National housing the Academy of Sciences and the National Research Council. On passing through the entrance hall, the visitor will find himself in a loity rotunda where he will see in actual operation, apparatus demonstrating the visible growth of plants, the pressure of light, magnetic storms, earthquakes, the gravitational pull of small masses, living bacteria, and other phenomena of nature. Seven large exhibition rooms surrounding the rotunda will illustrate the

latest discoveries in the mathematical, physical, and biological sciences, the latest results in industrial research, and will contain laboratories and observatories, in which the displays will change with the progress of science.



Floating Hospital That Makes Regular Trips around Manhattan Island Treating Injuries to the Feet of Boatmen, Dock Workers, Bathers, or Others

boat, suitably outfitted for the purpose, will make regular trips around Manhattan Island, N. Y., stopping at various points. Patients may board the vessel at any stopping place, and will receive treatment by a staff of doctors.

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Apparatus in Use at the Art School of the Louvre, in Paris, That Projects the Image of an Object onto a Screen in a Room Sufficiently Lighted to Allow the Writing of Notes by the Students: The Apparatus will Project Greatly Enfaced Reproductions of Insects, as Shown to the Right, Where the Magnified Image of a Moth is Reflected by the Inclined Mirror onto the Screen



# PROJECTION APPARATUS USED FOR THE STUDY OF ART

An apparatus for the direct projection of the image of an object onto a screen in a room sufficiently lighted to permit the writing of notes, has been applied at the art school of the Louvre, in Paris, for educational purposes in very large classes of students, and has given very gratifying results. This apparatus will project enlarged reproductions of drawings, engravings, or moldings, and also of such objects as living animals or insects, the latter magnified so that they resemble prehistoric animals. The object to be projected is placed upon a small table which is adjustable, by a wedge under it, to the required elevation. Above this table is a lamp of five candlepower, suitably adjustable for illuminating the object to be projected, which is placed upon the An inclined mirror above the apparatus reflects the projected image of the object onto a screen, about 20 feet square, located at some distance from the apparatus. The projections show the objects in relief, and with their colors, all with an elaboration of detail impossible by any other method.

¶Congress has authorized an expenditure of \$1,000 for the purchase of trophies to be conferred by the Bureau of Mines at the International Mine-Rescue and First-Aid Contests, upon miners who have performed noteworthy feats.

# NEAT DEVICE FOR HOLDING

Believing that there is room for improvement in the methods of keeping phonograph records, a Canadian inventor has patented a holder that has several good features. An apright rod is fastened to one side of the cabinet, and the records are held, in a horizontal position, on light plush-covered arms that swing on the rod. Each arm has a pin that fits the hole in the center of the record, and small spacers are provided between the arms to keep the records apart.



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# DEBRIS REMOVER FOR IRRIGATION CANAL

Removal of débris from the water of irrigation canals is efficiently done by a

ter of contrivance introduced by a western man.

by a The apparatus has a revolving cylinder

Débris Remover of Irrigation Canal, Showing Fingers of Cylinder Supporting a Man's Weight: In the Background is Shown the Paddle Wheel

composed of metal strips bent to a circular shape and placed about one inch apart, which is set in the concrete side walls The water of the canal. flows freely through this screen but the rubbish is retained against the sides. Extending through the strips from the inside of the cylinder, are fingers which pick up the débris and deposit it on a convevor at the top, by which it is carried to one side of the canal. A paddle wheel, installed a short way downstream. provides the motive power to operate the mechanism, and can be lowered or raised to start or stop the cylinder.

# 75 EAR CORN LOADED IN CARS

Loading ear corn into box cars has been facilitated by the production of a portable air-blast outfit, which is manufactured by an Illinois concern. When the front end of a wagon is elevated by a jack, its contents fall upon an endless of belt that conveys the grain to a powerful blast of air, which blows the corn inside size

the car. Both ends of the car are filled. simultaneously by means of a two-way spout, and it is claimed that a 60-bushel wagon can be emptied in approximately five minutes.

## STAMPS WORTH 200,000 RUBLES ON LETTER FROM RUSSIA

The first letter to have sufficient Russian postage came to the Minneapolis

post office late last June. It had stamps in 100, 500, and 1,000-ruble denominations, and so great was their number that they were attached to sheets which in turn were connected with the envelope. The sheets of stamps fastened together were 5 feet in length. The total value of the stamps was 200,000 rubles which in American money amounts to about 10 cents. According to prewar exchange rates, this sum would have been equivalent to a little under \$100,000-a striking illustration of depreciated moncy,



Procumatic Ear-Corn Loader, Filling a Railroad Car: The Conveyor Is in the Foreground, and the Air Blast is Located below the Hopper at the Near End of the Delivery Spout

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View of Tenderfoot Mountain Taken from City Pask, Showing the Spiral Drive to the Summit as It will Appear When Completed: It can be Plainly Seen How the One-Way Road Crosses
Itself on Its Way to and from the Top of the Mountain

# THE TENDERFOOT SPIRAL DRIVE

PERHAPS the most unusual road in the world, is the Tenderioot Spiral Drive, now nearing completion, at Salida,

Colo. It is so named, because one spirals four times around Tenderfoot Mountain in traveling over it to the top and back. Its entire length will be less than 21/2 miles, of which 2 miles already are in use, being finished, except for the removal of a few This rocks. portion of the road is 18 feet wide, and the grade is six per

The first mile and a half constitutes the approach from the county

cent.

road to the mountain, but even this part describes some wonderful curves to gain altitude. At the so-called "double-back,"

the road cuts through the ridge into Monument Gulch, close above Jiggs and Maggie, runs up along one wall of the cañon. turns round in the Punchbowl. and climbs back along the other wall, high overliead. finally leaving the cañon just opposite the point where it entered.

The last half mile of the double - track road is almost a perfect circle, around Tenderfoot to the turn-around, at the back of the



Diagram of the Tenderfoot Spiral Drive: As Far as the Turn-Around, the Road Is Full-Width, and from There On It Is Only Wide Enough for One Car



Some of the Prominent Citizens of Salida Working on the Part of the Great Circle Road Where It Crosses
One of the Gulches on the Way to the Turn-Around

mountain. Here ends the section of the road that is now open to travel.

Tenderfoot Mountain rises more than 500 feet above the railroad station, at the north end of the main street of the city, and the great circle is more than halfway up its steep side. Its summit is a mile and a half above the level of the sea.

Above the turn-around, the road will be a single-track or one-way road, spiraling three times round the cone-shaped peak, to a point near the summit and returning to the starting point. The first circle will ascend spirally once around. The second will pass around the top nearly on a level, rising slightly in the first half and descending in the second. The third circle will spiral down again to the turn-around, crossing the ascending circle halfway down.

The traveler will go up one, and down the other to the starting place, traveling all the time in the same direction around the mountain. Hence there will be no danger of "meeting a fool," and the road need not be made more than 9 feet wide. Each driver will have as much right of way as he has on the 18-foot road, and will he in no danger of meeting a "road hog," who will not keep on his own side. At no point on the mountain road can an approaching vehicle be seen more than a few lengths away, owing to the continual curve, and

this increases the danger on the two-way road.

Aside from the novelty of the double spiral, the single-track road has a great advantage over the double-track, in cost of construction, since much less material must be excavated in building it.

The supervising engineer says in his report: "To make a safe easy road without destroying the rugged beauty of the mountain, it was necessary to run it in a spiral, to a point within 25 feet of the summit, once round the top (less than 500 feet), then descend spirally to the turnaround. The top is too small to accommodate cars, and the mountain too precipitous to allow a turning place; hence the return road. The narrower cut thus allowed, will not interfere with the fill from the next circle close above (as the double-track cut would), nor make an unsightly excavation around the sides of the mountain.

"The constantly changing panorama of grand vistas from all parts of the road is unexcelled. Every turn brings to view some new scene of beauty or grandeur,"

The Tenderfoot Spiral Drive will be

The Tenderfoot Spiral Drive will be safe, but the motorist will instinctively hug the mountain side, and try to avoid dropping a moukey wrench into the busy streets far below.

It is proposed to erect a silent guide on the summit of Tenderfoot. A large dial will be cut on top of a pedestal, 4 or



Working on the Road at the Turn-Around: This has Appropriately been Called "The Punchbowl." From Here the Motorist may Follow the One-Way Spiral Road to the Summit, or may Retrace His Path to the Foot of the Mountain

5 feet high. There will be a raised point in the center, and other raised points in a circle near the circumference, marked with the names of prominent mountain peaks, and other places of special interest within view, with distances to them. These points will be so placed that by sighting along the center and one of the

points, the object named at that point will be in the direct line of sight. This will make it possible for any visitor to identify all the points of interest by consulting the silent guide.

This is important, as a great many places of historic interest are visible from the elevated summit of Tenderfoot. A



Grading a Portion of the Great Circle Drive: In the Center In Tenderfoot Mountain with the Spiral Drive Showing at Two Places on the Side, as It Winds up the Mountain

dozen or more peaks above 14,000feet elevation—the highest in the state can be seen along the main range of the Rockies. Many of the highest passes are also visible, as well as the peaks of the San Gre de Christo, or Snowy Range.

The Tenderfoot Spiral Drive is being built by labor donated by all classes of citizens. Most of the business and professional men of Salida have blistered their hands, and "cricked" their backs by their ardent attacks, with pick and shovel, on the rocky sides of Tenderfoot, and many who have not even a burro to drive over the road, have joined heartily in the good work. Merchants have donated a specified per cent of their sales for a day to the enterprise. Besides, some 150 of the state-reformatory boys have worked

on the road for four days. The Rio Grande Railroad donated a train, and the train men donated their services. Wednesdays were designated as railroaders' days, and Thursdays as business men's days, and there was an interesting rivalry as to which should accomplish the The women, too, have done their share, by serving hot meals to the laborers regardless of wind and dust, and by giving home-cooking sales to raise money to buy explosives for the road work. So far, about \$8,000 in labor has been donated, and another \$2,000 ought to complete the road as originally planned.

In short, 'the Tenderfoot Spiral Drive is a fine example of what can be accomplished by a whole community pulling

together in a common cause,

# HUGE QRGAN PIPES VOICED OUTSIDE THE FACTORY

Some of the organ pipes made by a California manufacturer were so huge that

HUGE ORGAN P
OUTSIDE THE

Some of the organ pip
fornia manufacturer we
the process of voicing
them had to be done
tontside the factory
building. The approximate length of the
sound wave produced
by the largest of
there are
tions tone produced is hard to distinguish, and to the average hearer sounds like a low murmur or continually repeated sound, but the zvibrations are so pow-Serful that they cause reciprocal vibrations in reciprocal vibration ceilings and walls.

## GOVERNMENT REMEDIES FOR RADIO STATIC

Static, that bugbear of radio enthusiasts during the summer months, has recently been made the subject of an explanatory discussion by the U.S. Bureau of Standards and different methods advanced to overcome as much as possible, these annoying disturb-



Three Organ Pipes That Were So Huge That They had to be Voiced outside the Factory: In the Lergen Pipe the Sound Wave Is 64 Feet Long

ances. The installation of a coil, or loop antenna, consisting of a suitable number of turns of wire wound upon a wooden frame about 4 feet square, is one of the ways suggested. Another is the

"ground antenna" consisting of an insulated wire laid on top of, or buried in a shallow trench in, the ground, for a distance of sev-eral hundred feet in the direction of the station from which the greater amount of broadcasting is to be received. The amateur should bear in mind, however, that in sacrificing the familiar elevated, or roof, antenna, he also loses considerable strength of the signals or waves received, and consequently must use a higher stage of amplification to obtain anywhere near the same results.

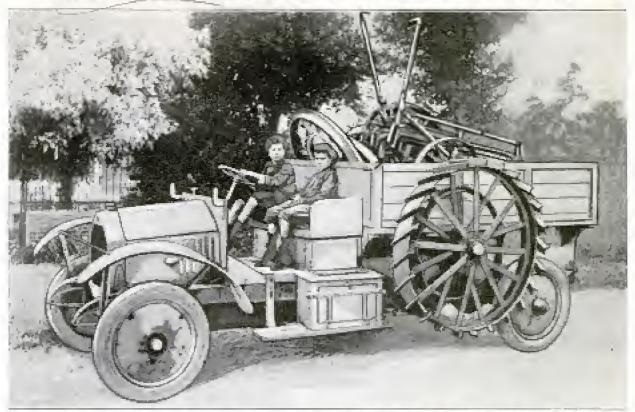
**(IA** building which is expected to be the finest and hest equipped laboratory for the study of iron and manganese ores is now in process of erection at Minneapolis, to be used jointly by the University of Minnesota and the U. S. Bureau of Mines.

P. 6.

n. y. Jimes

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## MOTOR TRUCK CONVERTIBLE INTO TRACTOR



Interchangeable Power Car in Use as a Road Truck: The Rims for the Front Wheels When in Use as a Tractor, are Seen behind the Driver's Seat. In Front of the Rear-Truck Wheels Are the Upraised Tractor Wheels

A motor vehicle that is interchangeably a truck or a tractor is in use on farms in France. To transform the truck into a tractor, a wheel rim of considerably larger diameter than the front-truck wheels is mounted around each of them, with rigid connections formed of radial struts. Just in front of the rear-truck wheels are a pair of tractor wheels on a special axle that can be lowered to bring these wheels to the ground when the tractor rims are on the front wheels. The rear-truck wheels are then taken off, and

on their driving axle a sprocket wheel drives a chain which engages a second larger sprocket on the tractor wheels. The change can be made in a short time, and does not require the service of a machinist,

■ Five coal-mining companies, whose properties are located close together in Utah, have formed a cooperative minerescue association, which maintains eight sets of mine-rescue apparatus and a combined motor rescue truck and ambulance.



Interchangeable Power Car in Use as a Tractor, Shown Hitched to a Plow Ready to Start to Work on the Stubble: The Rims are Mounted on the Front Wheels, The Rear-Truck Wheels have been Removed, and the Sprocket on Their Axle Is for Driving the Tractor Wheels

Built by: U. S. Playing card Co. horwood Chien

## BIRD MANSIONS CONSTRUCTED ON ELABORATE LINES

Bird mansions of artistic and elaborate structure, each having in the cupola a



clock with faces in four different directions, are to be seen on the lawn surrounding the factory of an Ohio manufacturer. The miniature"hotels," which are "seven stories" in height and contain many "rooms," measure approximately 3 by 3 feet and

are mounted on high iron poles. Bird lovers have expressed themselves in admiring terms concerning these houses, in which, it is said, numerous species of feathered families dwell in harmony.

# AUTOMOBILE PARKING LAMP HAS NEAT APPEARANCE

For the motorist who must, at times, park his car in dark places, a parking



lamp has been placed on the market that seems to be the last word in simplicity and neatness. The lamp has the usual full-size red and white lenses. The light bulb is

to press down and turn the ferrule to cause the lenses to part.

## NEW AND BETTER NET PLACED LIKE BAG OVER HAMMOCK

A new and better net for protection against mosquitoes carrying deadly malarial-fever germs has been designed by an English medical officer stationed on the west coast of Africa. The white men at this place all sleep in hammocks, and before retiring, a tube of netting is slipped over the hammock, one end being tied at the foot. The other end is rolled

The Lancet 4/17

MECHANICS

Back far enough to allow the man to climb into the hammock, when it is pulled up and tightly closed by a drawstring. To keep the net away from the sleeper, spreaders are provided for the bags, the use of which is said to have greatly reduced the number of fever cases.

# NUTCRACKER IS POWERFUL AND EASILY CONTROLLED

Perfect control of the power exerted on a nut in cracking the shell is possible



daw.

with the use of a nuteracker invented by a Texas man. The appliance has a solid felt-lined base and a ratchet, or gear, arrangement operated by a long handle, that gives the user ample leverage in breaking the hardest shells, The regulation of the

crushing power is valuable in that the nuts can be cracked to any desired degree, without scattering the shells in all directions, or smashing the kernels into little bits. 6.21

### VENTILATOR BASE ADJUSTABLE TO PITCH OF ROOF

By making the flue base adjustable to the pitch of the roof, an Indiana man has

produced a ventilator which should be popular among poul-try raisers. The contrivance, which is constructed of tin, has a setscrew attachment in its base that permits the flue to be raised or lowered, so that



the ventilator will always be in a vertical position.

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# milimota & Cos lsinga, Johyd

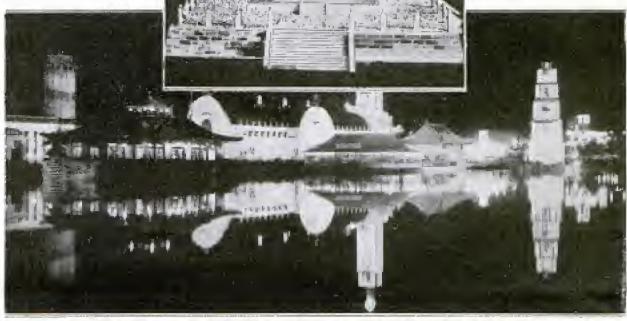
# POPULAR MECHANICS Jakent 401

## JAPANESE HOLD BEAUTIFUL PEACE EXHIBITION



There was held recently in Tokyo, Japan, a peace exposition, that for size and beauty far surpassed anything of like nature done in that country. The exhibition buildings were lighted during the evenings with searchlights throwing beams of various colors. Among the many marvelous exhibits there

was a jewel pagoda, 2 feet 4 inches high, made of mother-ofpearl, and decorated with real pearls. Some 120,000 small pearls were scattered about the base of the pagoda to resemble pebbles. This little model, besides its rare beauty, represented a value of about \$150,000 at the present market price of the jewels.



The Upper and Lower Views of the Buildings and Grounds of the Tokyo Pence Exhibition were Taken at Night. Center: One of the Exhibitis; a Pagoda Made of Mother-of-Pearl and Real Jewels

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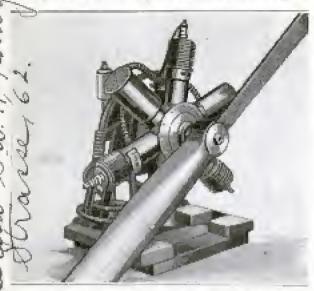
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### POPULAR MECHANICS

# MEAT ROTARY MOTOR WEIGHS ONLY-TEN POUNDS

A small rotary gasoline motor has recently been developed that would be par-



This Little Rotary Gasoline Engine Develops 11/2 Horsepower, Yet Weighs Only 10 Pounds without the Magneto. It Operates on the Two-Cycle Principle

ticularly well suited for use in airplane gliders. Without the magneto, this

motor weighs only 10 pounds and develops 1½ horsepower. It operates on the two-cycle principle, giving one explosion in each power cylinder at every revolution. The engine is supplied with three power cylinders and three cylinders in which the explosive charge is compressed before going to the firing cylinders, /

# BORING OF CHANNEL TUNNEL WILL SEE NEW METHODS

If the boring of the tunnel under the English Channel is decided upon, new methods may be inaugurated for doing this kind of work, according to recent announcements. An excavating machine is now being assembled which, it is thought, will have a far greater output than any hitherto used for tunnel boring, and to further insure speed in construction, a considerable number of working points are under consideration. Removing the borings has been made the subject of special study, the way most likely to be employed being that of converting the refuse into semiliquid form by adding water and then discharging it through piimps.

able waterworks system constructed by an Indian living in the very hottest part of the dry belt in British Columbia.

Some little distance behind his house, a small mountain stream winds its way through a low range of hills. This stream

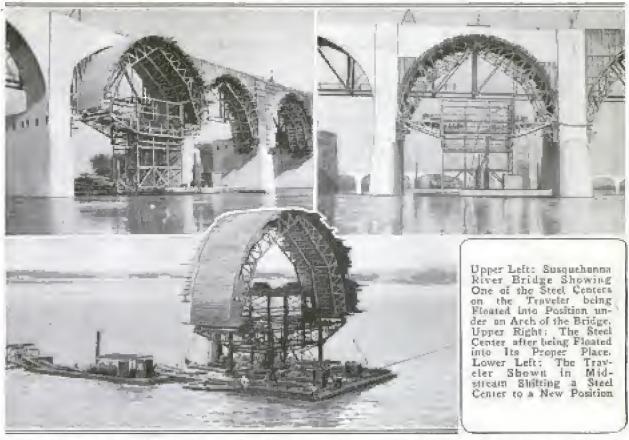
> the Indian tapped on the hillside above his house with an aqueduct which he extended down to the cedar stump. The stump was hollowed out to form a reservoir, and from this he ran one pipe into a trough. water being always cold from a distant glacier, the trough served the purpose of a refrigerator A second pipe brought water to house for all sanitary and culinary needs, while a third, attached to a long hose, made possible the cultivation of an extensive tract which would otherwise been barren in this dry region. Stock can also be watered at the trough.

## 952 2-CEDAR STUMP IS RESERVOIR FOR WATER SYSTEM

Probably no cedar stump was ever put to more original use than the one which forms the reservoir of a perfectly service-



Water is Brought by Gravity from a Near-By Stream to This Cedar-Stump Reservoir and Distributed through Pipes for Refrigeration and Household Use



# 757 STEEL TRAVELER ON BARGE LIGHTENS BRIDGE WORK

In building the concrete arches for the new bridge across the Susquehanna at Harrisburg, Pa., good use was made of a steel traveler mounted on a barge and carrying steel centers. The entire bridge is more than 3,000 feet long and is over the water for nearly its whole length. It was decided that, under the circumstances, the centers could be handled to the best advantage in this manner. While the work on the new bridge is in progress, it has been necessary to keep traffic in operation on the existing steel bridge. A part of the new bridge is being built first; then the track will be moved over to the new portion, and the rest of the bridge will be concreted.

Between the two ends of the bridge there is a difference in elevation of over 20 feet. For this reason, it was necessary to design a traveler that had sliding parts, enabling it to reach the centers at the high end and yet pass readily under the centers at the low end.

When all is in readiness for placing a center, the traveler is towed underneath, and then the sliding frames are hoisted until they engage the heel of the steel ribs. Worm-geared safety winches are used to raise or lower the centers. Whenever it is necessary to move the

centers, they are pulled in horizontally by means of ratchets, lowered with the winches, and towed to position at the next span, where the operation is repeated.

The forms and reinforcing steel are handled by a derrick boat. The whole structure calls for a total of 92 set-ups of the arch ribs.

"SANITARY-BREATHING" PIPE PLACED ON TRACTOR

"Sanitary breathing" for a tractor is possible with a special pipe which is fit-

ted into the crankcase and extends above the top of the implement. Oil-soaked steel wool is placed in a container at the top of the pipe to keep out the dust and grit encountered during the day's work, thus prevent-



ing any foreign matter from reaching the internal parts of the engine.

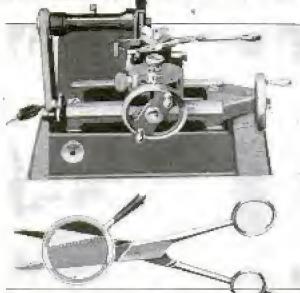
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# SPEEDY AND ACCURATE

Serrations on the edge of a shear blade that heretofore have usually been made with a hand file, after the temper has been removed, a can now be much



Shear-Serrating Grinder Seen at Work on the Blade of a Shear: The Small Knucled Wheel in Front Adjusts the Machine to Cut a Plain Edge When Desired

more efficiently ground by a machine specially designed for the purpose. The machine is self-contained and has a framed base, inside of which is a small motor. This drives a combined oscillating bed and traveling carriage in such a manner that the grinder will impart to a shear blade any desired number of serrations per inch. A slight turn of a knobin front of the machine will throw out the serrating mechanism, and a plain edge will then be obtained, the state

# PHOTOGRAPHIC FILMS RUINED

Recently a photographer had the unpleasant experience of having some exposed films ruined because he placed some samples of high-grade carnotite ore in the safe where the films were stored. The radioactive properties of the ore caused peculiar designs to appear on the films when they were developed.

# COAL TRAIN BADLY WRECKED

On a steep grade on a rocky hillside of a western mining camp a loaded coal train, consisting, besides the locomotive, of 20 steel gondola cars, was left standing recently while the conductor went to a telephone to get orders, and the engineer and fireman seized the opportunity to go for some cigars. While thus deserted, air leakage released the brakes, and the train went full-speed down the steep grade. After traveling two miles, the heavy train crashed through an open switch and was entirely wrecked. The locomotive and most of the cars crumpled, and great masses of coal were scattered over the hillside.



Wreckage of a Train of 20 Gondols Cars, Loaded with Coal, That Ran Uncontrolled for Two Miles down a Steep Grade in a Western Mining Camp: The Locomotive and Most of the Cars were Completely Smasheds and the Coal was Scattered over the Ground

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This Shows One of the Pinch-Extraction Plants Where a Large Percentage of the Turpentine and Pine Oils 14 2 2 are Removed from the Sc-Called "Fat" Lumber. The Still, Condenser, and Steam Klin.

Are on the Second Floor, and the Storage Tanks Below

#### SAVING OF BY-PRODUCTS IMPROVES LUMBER

THE tendency of modern times is to eliminate waste of all sorts and to recover by-products once considered of no value. Many a flourishing business today owes its prosperity to the fact that some waste product has been converted from a source of expense to one of rev-

enue. In the southern lumber industry this principle is now being applied in such a way that not only are valuable by-products recovered, but the value of the lumber is also increased.

The process that is being adopted is a method of extracting from lumber a considerable portion of the contained resin,

to several reasons. It will not hold paint;
to it is hard to work; it splits easily; the
of pitch boils out in hot weather, and it
ess costs more to ship because of its extra
hat weight. At the mills, this so-called "fat"
ted lumber has a value of only about oneev- third that of first-grade lumber. Yet the
substances that

substances that lower its value have a considerable value of their own, and their removal increases the value of the lumber itself.

The recovery process, developed at two southern mills, is extremely simple and requires the labor of only two men to operate a commercial - size plant. The lumber as it



Interior of the Steam Kiln Where the Lumber is Run In on Cars and Subjected to Heat from the Steam Pipes in the Floor

turpentine, and pine oils. Lumber that has a high percentage of these substances is of low commercial value for

comes from the saw, is loaded on cars and run into kilns, which are then closed and sealed. Heating coils in the floor of

the kild serve to keep the temperature at the required degree, and live steam is circulated around and through the lumber. As the temperature in the kiln increases,



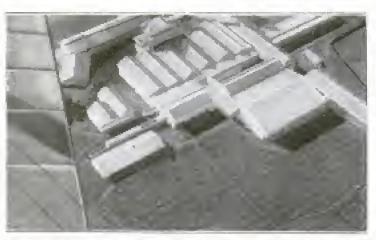
In These Stills the Crude Resinous Liquid is Sub-jected to Further Heat and the Turpentine and Pine Oils Separated from the Water

the moisture in the lumber boils out, carrying with it, in the form of vapor, much of the resin and turpentine. live steam that is introduced into the kiln aids materially in speeding this extraction and carrying it to completion. The kiln treatment lasts 24 hours, and the lumber is then sent to the usual drying kilns. The treated lumber dries out much more rapidly than the untreated lumber.

The vapors coming from the treatment kiln go to the refining plant, which consists of a still, condenser, and storage tank. The still is charged with the mixture of crude turpentine, pine oils, and water, and is heated by live steam introduced through a spray pipe. As the temperature is raised, vapors are given off, consisting of approximately 60 per cent turpentine and 40 per cent water. This vapor is condensed, and the liquid passes to an automatic separator that removes the turpentine from the water. Toward the latter part of the run, the percentage of turpentine decreases and the percent-age of pine oils increases. The turpentine produced by this method is highgrade, water-white, and can be used for any purpose to which gum turpentine is suited. The pine oil recovered finds use in the mining industry, where it is applied in the flotation process for the recovery of finely divided mineral particles from the worthless gangue.

The extraction process is not confined to the treatment of cut lumber, but can be used for the treatment of stumps that have been left on cut-over land. These stumps usually contain a higher percentage of resin and turpentine than is found in run-of-mill lumber, and the value of the extracted products should go far toward the cost of clearing the land.

It is believed by persons in a position to know, that the process can be economically installed in any mill having a capacity of 70,000 feet of lumber a day, Actual tests have shown that the weight of the lumber treated by this method is reduced from 20 to 30 per cent with a consequent saving in the freight charge for shipment. The value of the recoverable products, based on the total cut of the southern mills, runs into startling figures.



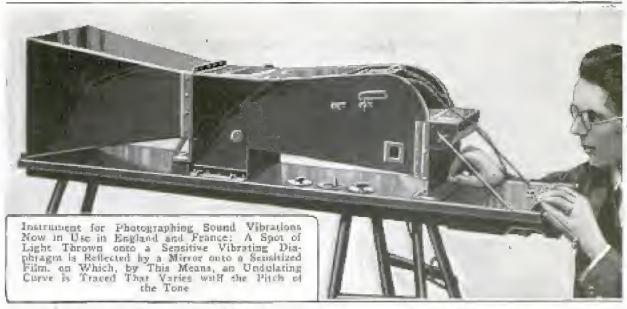
Airplane View of the Largest Packing Plant in Australia, Situated on the Banks of the Rois River, at Townsville, Queensland

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#### PACKING PLANT LARGEST IN AUSTRALIA

The largest packing plant in Australia, known as the Ross River Meatworks, handles annually from 50,000 to 90,000 cattle and 50,000 sheep. The plant covers an area of five acres. During the operating season, which lasts about seven months, from 500 to 600 men are employed. It is located in Townsville, Queensland, on the banks of the Ross Large quantities of tallow and other by-products are exported from this plant.

Queen classed de material



## PHOTOGRAPHIC RECORDS MADE

An instrument for photographing tones, or sound vibrations, called an "audiometer," has recently come into use in Eng-land and France. Inside the apparatus is a sensitive diaphragm that responds precisely to any sound vibrations. In connection with this is a mirror which reflects onto a sensitized film a spot of light from an electric bulb. This spot of light moves with the vibrations of the diaphragm, and therefore, when the film is rolled along in a direction at right angles to this movement, an undulating curve, which varies with the intensity of the sound, is traced upon the film. This then passes into a tank below the apparatus where the film is automatically developed. Without the film, the spot of light may be observed on a ground-glass screen, in the way observations are made with any ordinary camera.

#### SIMPLE RULES FOR TESTING HOME GAS BURNERS

7 9

Simple home tests have been outlined for the householder who wishes to determine if his gas burners are properly adjusted. If they light easily and turn off quietly; if they burn in sharp blue cones with purple edges; if they can be turned from and still burn evenly, and if cooking utensils keep clean where the heat from the burner tips strike them, then the burners are all right. If the burners do not come up to these tests, it is well to have experts from the gas company make proper adjustments, as this plan will insure the best results.

#### FLOCK OF PIGEONS HOUSED IN ARTISTIC BUNGALOW

Believing that even the pigeon house should harmonize with the surroundings, a California man built his in the form of an artistic bungalow. The house rests on a stone pillar that rises from the center of a fishpool, both the pool and the pillar being made of cobblestones set in cement. At a point about halfway upsthe pillar, a circular bath for wild birds has been constructed where the birds will be safe from prowling cats.



This Bungalow-Type Pigeon House Rests on a Pillar Made of Cobblestones That are Set in Cement

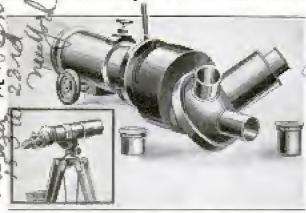
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#### TELESCOPE ATTACHMENT GIVES THREE MAGNIFYING POWERS

A new attachment for portable telescopes furnishes three magnifying powers instead of only one. The attachment

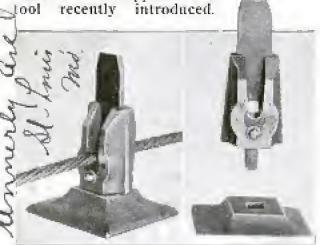


Amachment for Portable Telescopes That Has Inter-skangeable Eyepieces Furnishing Three Magnifying Powers: Its Position on a Telescope is Shown in Inset

has the same general appearance, and operates on the same principle as the revolving objective of a microscope, but instead of being at the objective end of the instrument, it is clamped over the barrel at the eye end of the telescope. When used on a telescope having a normal magnification of 12 powers, the three eyepieces of the attachment make it possible to view objects magnified either 12, 20, or 40 times.

#### HANDY TOOL HOLDS AND CUTS WIRE CABLE EASILY

Anyone who has had occasion to cut a piece of wire cable with a cold chisel and hammer knows what an exasperating job it is, and will appreciate a



This Cutter Holds the Cable in the Body Casting, and the Cutting is Done between the Lower Die and the Bar, Which is Struck with a Sledge

The device consists of a body casting, base plate, and cutter bar, and is so made

that it can be used on an anvil or other solid foundation. The cable is held selcurely in the body casting, and is cut' between a lower cutting die and the cutter bar, when the latter is driven down 🐆 by a sharp blow with a sledge.

#### SIMPLE PIPE OR NUT WRENCH ENTIRELY SELF-ADJUSTING

For gripping objects such as pipes and nuts, a very simple wrench is so con-structed that it is entirely self-adjusting. At the base of an opening in one handle, near its jaw, is a fulcrum for the other handle, which acts as a lever as it slides through the opening, until it grips the pipe or nut-between its own jaw and that of the other handle. The wrench is made adjustable to widely varying sizes by means of an auxiliary fulcrum, which can be swung into position so as to bring the jaws closer together for smaller-sized



Self-Adjusting Wrench: In Lower Views Where's Handle is Cut Away, Movable Pulcrum is Shown in Position, at Left for Small Objects, and at Right for Larger Ones

objects. It has a hammer head on the back of one jaw, and a screwdriver at the end of one handle.

#### TWO JAPANESE SWIM GREAT YANGTZE RIVER

On May 21, two Japanese swimmers, named Nishimura and Urakami, succeeded S in establishing the record of swimming the great Yangtze River of China at a point between Hankow and Wuchang. This is the first crossing to be made at this point. The hazard of such a swim t does not lie in the distance, seven miles, but in the strong uncertain currents and the submerged rocks in the river.

([Laboratory tests have demonstrated] that hituminous-clay pipe can be used for drainage and sewerage in place of A special bituminous cast-iron pipe. compound is used in the joints.

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# no information as & maker.

POPULAR MECHANICS

409



"SEA HORSE" IS LATEST FAD AT BATHING BEACHES

RIDING "sea horses" is the latest fad introduced at the beaches at New York City, and the illustration shows one of the fair marriable enjoying a "constructed of light wood having strong buoyant qualities. Although originally designed as a means of teaching beginners to swim the innovation has become exceedingly popular with feminine bathers who already have conquered the art.

CASTING WEIGHT 275.000,LSS.

#### HUGE CASTING IS SHIPPED HANGING BETWEEN TWO CARS

WHEN the time came to ship a large ingot mold from a West Virginia foundry, special arrangements had to be made because of its great size and weight. By placing bridge girders, made for the purpose, inside the casting and allowing the ends of the girders to rest on two 75-ton-capacity cars, the casting was hung between the cars and shipped to its destination without mishap. A special train was required for the trip. The shipping weight of the casting was 275,000 pounds, and when it was made, it had to be left lying in the sand for eight days before it was cool enough to be removed. It took only four minutes to pour the molten metal when the casting was made, the iron being melted in six furnaces and poured from four ladles.

Wheeling Inglet of It owned the Copyrighted Pateria

drev. Marid Isriero, Chicago Tribune 2696 Ferry Park au. Chicago Tribune 100 1 Papulga MECHANICS 6/26/22

INSTRUMENT FOR DESCRIBING ANY KIND OF AN ELLIPSE

For describing an ellipse of any shape within its scope, an instrument for the use of draftsmen or machinists has been



Instrument for Describing an Ellipse of Any Shape and at Any Desired Point: In Place of the Pen, a Pencil or Scriber may be Used

recently patented. By placing the center point of the instrument at the desired center of the ellipse and alining its supporting bracket parallel with the major axis, the scribing point may be adjusted to the required distance from the center, and will then draw an accurate ellipse. An ordinary drafting pen, a pencil, or a scriber may be used with the instrument.

ARMY'S AERIAL "BUS" BUILT
LIKE FOREIGN PLANES

The Army Air Service at McCook Field, Ohio, recently added to its equipment a passenger-carrying monoplane designed and built by Fokker of the Netherlands Airplane Company. The plane has a cabin with a seating capacity for 10 persons, and is fashioned along the lines of the planes used in Europe on the air route from Berlin to Moscow. The wing spread is 78 feet, and the fiying speed ranges from 41 to 95 miles per hour. The plane is powered by one standard Liberty engine, located in the very front of the fuselage. The pilot's cockpit is above and just behind the engine.

# AUTO-LOCKING DEVICE CAUSE

A recent fatal automobile accident in Wisconsin shows that one demand that should be made of any steering-wheel lock, is that it be inoperative except when intentionally locked. While two men were driving along a country road, a patent lock on the steering wheel became locked, making the car unmanageable. Before the brakes could be applied, the car crashed into a post and overturned, killing one of the occupants.

7662 — ATTRACTIVE NOVELTIES MADE FROM POLISHED COAL

That coal—plain ordinary coal—can be used for making ornamental novelties has been shown by an eastern manufacturer. Match holders and ash trays have been machined from lumps of coal, and after having been polished and buffed, have the appearance of black glass. Two surpris-



This Ornamental Match Holder was Machined from a Solid Lump of Cost and Buffed to a High Polish

ing features of the articles are, that they may be handled freely without soiling the hands, and that they will stand nearly as much rough handling as though made of solid glass.

Those wishing further information on anything described in the editorial pages can obtain it by addressing Bureau of Information, Popular Mechanics, Chicago.



This Fokker Monoplane, Recently Delivered to the Army Air Service at McCook Field, Ohio, Seats 10 Passengers Comfortably and Has a Flying Speed of 41 to 95 Miles an Hour

nitherlands

as a Flying Speed of 41 to 95 Miles

Copyrighted material

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Scene in a Rock-Salt Mine, Showing One of the Electric Drilling Machines Boring a Hole in the Salt: The Machine is Clamped to the Vertical Bor, and the Augerlike Steel is Fci Forward through the Center of the Electric Motor That Drives It

A VISIT TO A ROCK-SALT MINE

BY DAVID H. LEVINGSTON Lake Charles La

HERE'S a thrill in being lowered down through a black hole into the earth 600 feet. One becomes used to it, they say, but, believe me, not at once.

One morning recently, the big elevator lowered in the shaft at the salt mines on

Avery Island, nine miles southeast of New Iberia, La., having on board a camera man. who was going down on a special assignment to try out a new light. With him were the superintendent of the salt mines, some of his oiforce, and the fice writer.

There are no preliminaries nor ceremony about the descent. The shaft is a very uninviting affair, and has an appearance of "come down if you wish; I'm not promising you anything." The elevator is not a handsome brass or steel-netted cage nor is there a boy in attendance. After all got on, it just went down.

The elevator consists of a suspended platform, large and commodious. On that downward trip the trick is to stand as near the center as possible and remain still while the bottom gradually sinks from your feet. There's no handhold for the nervous, nor any place to lean

against for those whose

knees wilt.

When the elevator starts below there's no noise nor parring of a motor. A faint sound of dripping water reaches the ear occa-sionally, but it's imagination; there's no water. You suddenly feel yourself leaving, and instantly realize that you are going down a hole, made like a large, square, concrete smokestack, and then blackness comesnot mere darkness. You get a splendid definition of the word dark. Not a thing can be seen that even suggests light, and a strange feeling of absolute loneliness comes over you. You can't feel the presence of any but yourself and you wonder if all the origi-



The Rock Salt as It Appears after having been Broken Down by the Charges of Dynamice

nal party are still aboard. It's very quiet. There isn't much laughter nor talk; the others feel about the same way you do. All the jokes have been left up on the surface of the earth. Then in that black, downward drop there comes a rush of cool, salt air. One member aboard exclaimed, when he felt the weird change of temperature come up his legs, "My goodness! I believe my pants came off!" He had the correct sensation, all right.

But, when the bottom is reached, what a change! And what a surprise to find down there that the temperature is pleasant, standing around 72°. The atmosphere is as balmy as early summer. A cleaner spot could hardly be imagined. The long avenues, as I would call them, with their strings of electric lights hung on the walls, the arches spanning 60 feet overhead, form an inspiring and beautiful sight. On every hand there's salt and nothing but salt, rock salt, hard as flint, dry and warm. There is not the slightest suggestion of damp or chill.

Accustomed to the behavior of salt as we are in this southern climate, expecting it to drip and cause everything around it to be messy, one has constantly to remind himself that he is down in a solid rock of salt, with nearly 500 feet of the mineral above and 1,000 feet of it helow. Tests have proved this bed of salt to have a depth of exactly 2,999 feet in places.

A minute or so after we landed at the foot of the shaft, there came a rumbling noise as of distant thunder. It seemed

to roll on and on, reverberating down the long corridors, in and out of those tall arches, sometimes increasing in its growl, then diminishing as it entered one of the lower-roofed cavities. It was not a noise that would fill anyone with dismay, icar, or anxiety, but something that seemed, in a way, to be expected in this strange underground cavern. It was all so new and different that it thrilled one with a pleasing satisfaction of having entered upon an adventure worth while. No questions were asked. The natural supposition was that the summerlike thunderstorm had been caused by a blast away back in one of those dark channels.

The camera man wanted to "shoot" a scene showing how the salt was torn from its bed. This led the party down one of those long avenues, with the small lights strung alongside, just as though they were so many tiny street lamps, and the tall arch glittering overhead. A narrow-gauge railroad ran down the center, reminding one of a miniature street-car line, laid flat in the hard, dry salt that crushed under the foot.

About halfway down this aisle, one of the party remarked, "Gee whiz! Let's go back; I can't breathe."

"That's just imagination," the super-

intendent said, laughing.

The party marched on toward a strong light in the distance which foretold of some operation going on. At the spot, there was a crew of men drilling, with



The Broken Salt is Loaded into Small Cars Which are Drawn to the Bottom of the Shaft and are Then Raised in the Cage to the Surface of the Ground

#### POPULAR MECHANICS



Where the Salt has been Recently Blasted, the Surface Is a Glivering, Silver-White Mass. At This Point, a Drill Operated by Compressed Air is being Used to Make the Holes That will Receive the Charges of Dynamite for Breaking Down the Salt

long steel drills driven by electricity, into the solid rock. They bored deep holes into the sides for the charges of dynamite, and overhead to test if any loose salt from the last blast remained. Every measure for safety is observed before another blast is set off. A million and a half tons of salt have been mined to date, and no accidents, caused by lack of

precaution, have happened.

Then they guided us to another of those long lanes, perhaps 50 feet across and 50 to 60 high. We were taken to a spot that showed the loading of the shattered salt after the dynamite had done its work. They load the small cars with a shovel that is driven by electricity instead of steam. That's one wonderful thing about the operation of these salt mines. Everything below is controlled by electricity; the large wires lie harmlessly at your feet everywhere, running over the dry pebbles and chips of bonedry salt. The shovel operates on a continuous-tread base and walks around the mines at the will of its driver, swinging easily from side to side, noiseless—no smoke, no ashes, no dirt.

Where the salt is blasted away, the walls are silver-white and glitter like millions of diamonds. The beauty is amaz-

ing. The salt falls off sometimes in perfectly square layers, measuring from one to three or four inches thick, and is transparent. One cake, measuring just about an inch thick, was so clear one could read through it. The old walls become a little discolored in time, because there is some triffing condensation during the summer months, but they are not black and there's no dirt nor dust down there—and no mosquitoes!

Mules are used to hand the cars to a central point where they are picked up by electric cars. The crew worked hard and fast to load their cars, and then a small, fat mule was brought forward, attached to the front car, and told to pull away. Just as the nervous animal started off, the camera man signated for the

touching off of the light.

It came on ablaze!

The nucle, having been down in those mines longer than we, knew that no sudden light could be natural, and when the flash came, he made a noise that sounded much like stepping on a ripe tomato. He turned right around and started for the rear to hide behind the train, and we caught a view of his retreat.

The men arranged the loading of three cars on the elevator. From away off,

some place in those dark lanes, the small train could be heard approaching over its steel rails. Echoes came from everywhere of the rumbling and bumping cars. Soon, from around the corner of one of the large columns of the immense lobby, a trolley pole was seen flashing sparks from the wire, pushing its loaded train. The cars went up, and, as they left, the camera man cranked his machine. A moment later the rattling noise of the auto-

matic machinery, in the rear of the shaft, that takes care of the "empties," could be heard, and, by the way, this is the only noise-making machinery in the mines.

A few minutes later we were again on the surface and in the midst of a cold drizzle that had been coming down in New Iberia and the island for a solid week. It was quite a change and rather disagreeable compared with the snug, warm atmosphere 600 feet below.

#### FEAST OF THE FLYING FISH JAPANESE BOY DAY

BY A. G. CLUTTERBUCK

ON the fifth day of the fifth month of Cach year, in Japan and among the Japanese in foreign countries is celebrated the Tango-No-Sekku, or the Feast of the Flying Fish, known to the white people as Japanese Boy Day. Swaying in the wind and flirting their tails gaily, thousands upon thousands of paper and cotton fish, resplendent in flesh pink and vermillion, fly from myriads of poles, from clotheslines, and from roof tops, They are of all sizes from 2 to about 5 or 6 feet long.

Tango-No-Sekku is a big feast with the Japanese-especially the Japanese



Thèse Gaudy Paper Plah Are Only Some of Thousands That are Flown in Japan on May 5 Each Year, to Celebrate Tango-No-Sekku, or Japanese Boy Day

boys. To them May 5 is set aside as an occasion of honor to the first-born of every family, and to Japanese boys in general. The flying fish are but a small part of the feast, for besides that, there are presents and gifts of images, toys, statuettes, and manikins of Japanese legendary heroes, all given with the idea of teaching the youngsters lessons of courage and manliness. It is a kind of Christmas season for the Japanese youth.

Sometimes the number of fish on the pole indicates the number of males born in the house, and sometimes it indicates is customary to present a paper fish to the Japanese family to which a boy has been born since the previous festival.

The living rooms of all homes having male heirs are specially decorated for the occasion. Out from heavy wooden chests, where they have been hidden until that day, come the toys and gifts. Flowers are used in profusion.

There is nothing of a formal nature in the festival. The boys spend the afternoon visiting one another and comparing their gifts, and many pienies are held. Special foods are served at the Feast of the Flying Fish. One is the chimaki, which is composed of beans and red rice wrapped in fily leaves. Another is the kashiwa mochi, a rice cake wrapped in oak leaves-the oak leaves being a symbol of strength and endurance.

Games played by the boys on that day differ from those of other days. The lads arm themselves with shobu leaves, and with these long swordlike blades they

have exciting battles,

The principal toys given usually take the form of images or manikins which represent famous characters of Japanese history. The chief of these is Jimmu Tenno, the first mortal emperor of Japan. and direct descendant of the sun goddess. Benkei, a sacred bull, is the second favorite. The third favorite is Kato Kiyomasa. the son of a blacksmith, who commanded an army sent to invade Korea in 1592. He is celebrated because of his feats of strength and daring. Another hero, also a favorite with the boys, is Kintaro. In appearance he is a nude little fellow, not unlike Cupid. He is a fabled strong boy who lived in a mountain cave years ago.

The carp is the patron fish of the Japanese boy, and is a symbol of strength. being the only fish that can swim against the swift currents of the mountain

streams of the island empire.

the number of friends the family has. It Chitlerbrick II aincea.
Kanai J. H. Copyrighted material



This Power-Driven Scraper Scoops the Gravel from the Bank and Delivers It to the Elevator Which Carries of the Waiting Railroad Carries It to the Storage Bin. and from There It Goes to the Waiting Railroad Carries

#### DEMAND FOR GRAVEL MAKES WASTE LAND VALUABLE

The road-building era is responsible for many new developments, and among other things, it is turning a lot of the nation's waste places into wealth. Rock bluffs have become quarries to supply the crushed stone for concrete paving. Gravel banks that have been considered of practically no value now suddenly have become little gold mines for their owners. An example is the big gravel bed at Prairie du Chien, which Wisconsin road builders are now utilizing. A big stretch of high bank along the Mississippi, so gravelly that it has not even been good for pasture land, let alone for farming, has become of high value, because the gravel there is classed one of the finest in the country. Big powerdriven scrapers are scooping out the gravel and delivering it to elevators that drop it into railway cars ready to be shipped to places where road building is in operation. The "poor land" of so many years has become "rich land."

(For the use of the city-planning committee of New Orleans, La., an aerial map of the city is to be made. The photographs will be taken from an elevation of \$,000 feet, a special camera being used. Two previous attempts to make such a map have failed due to adverse weather.

## COMBINED AUTO STEP PLATE AND SUITCASE CARRIER

A combined aluminum step plate and suitease carrier, which is attached to the running board of a car by four screws, has just been placed on the market. The tread of the step is hinged, so that part of it can be raised, a strap passed through



Combined Auto Step and Carrier as It Appears When Mounted on the Running Board of a Machine and Holding a Spitease

a special opening, and the suitcase or traveling bag held securely on the running board, while the machine is traveling at high speed or over rough roads, and E. S. Kingow,

416 Iran POPULAR MECHANICS

### TO SAVE CITRUS TREES TREATMENT FOR ROOT FUNGUS

Heroic treatment is sometimes necessary to save orange and lemon trees that have been attacked by root-fungus dis-

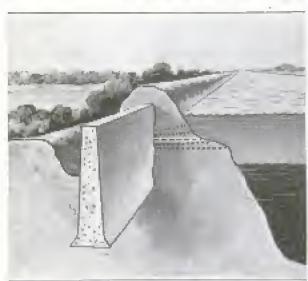


This Lemon Tree is Supported with Braces, and has Had Its Trunk and Remaining Roots Treated to Kill the Root-Fungus Germs

cases. In some cases, the taproot and lateral roots must be cut away to such an extent that the tree must be supported by staging and braces. The affected portions of the remaining trunk and roots are then thoroughly scraped and treated with powerful solutions to kill the fungus germs.

#### SOLID CORE WALL PREVENTS QLO UNDERMINING OF LEVEE

The failure of protecting levees along rivers subject to excessive high water, has been traced, in some cases, to the activity of crayfish and other borers that burrow into the embankment and open



The Concrete Core Wall in This Levee Prevents the Borers from Opening Channels through Which the Water might Pass

rugh Wation.

channels through which the water may To guard against this difficulty, a levee has been designed with a concrete core wall extending well below the bed of the river and reaching almost to the top of the levee. This wall stops the progress of the borers and prevents the undermining of the levee by water passing along porous strata of ground.

#### "ROMAN CHARIOTS" ARE MADE FROM WINE BARRELS

Burlesquing the ancient Roman chariot races, members of a western motorcycle club entertained the spectators at one of, their recent gatherings with an exhibition of extraordinary riding. The "chariots" were constructed of wine barrels which were cut obliquely in two, each half providing the body for one equipage. Automobile wheels were then mounted on the strange bodies, and to heighten the ef-



One of the Outfits Which Furnished Entertainment in the Burlesque Roman-Chariot Races Con-ducted by a Motorsycle Club

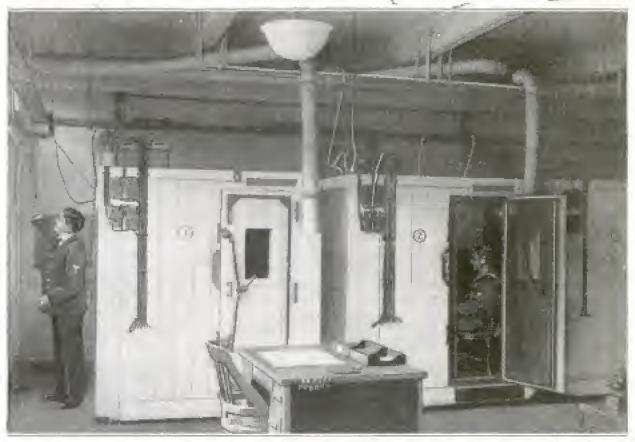
fect, the "charioteers" donned costumes reminiscent of the old Roman days. Hitched behind motorcycles, the chari-5 ots were towed at high speed around the arena, affording genuine excitement.

#### C1 17 2 1 WOOLENS MADE MOTH-PROOF BY NEW GERMAN PRODUCT

Of special interest to manufacturers of woolen goods is an announcement that a concern in Germany has placed on the market a product that makes wool immune to the attacks of moths. By its use, cleaners and dyers can give their goods, at a small additional cost, a mothproof finish, and all woolen fabrics canbe successfully treated. The goods are immersed in a cold solution of the product, and afterward rinsed,

chridian cottin form

REMOTE-CONTROL BOOTHS FOR ARLINGTON STATION



These Are the Remote-Control Booths for the Arlington Radio Station: They Have Double Walls to Make Them Soundproof, with a Grounded Copper Screen between the Walls to Absorb Stray Induction from Outside Electric Circuits. At the Extreme Left Are the Antenna Switches

Situated in the coastal radio room of the Navy Department Building, at Washington, are two small booths from which the transmitting apparatus of the famous Arlington radio plant, four miles away, is manipulated by remote control. An ordinary telegraph circuit is used between the control station and the sending station, and pressing a key in one of the control booths automatically sends the dots and dashes from the Arlington antenna.

Each of the control booths resembles, in general appearance, a refrigerator, and the construction is, in many respects, quite similar. The booth has double walls, with a copper screen between them, and completely surrounding the booth. The screening is grounded and serves to absorb any stray induction from outside electric wires and motors. The booths are of soundproof construction and are ventilated by fresh air drawn through large pipes from outside the building.

The liatteries for the receiving apparatus are placed above the booths. There are two sets of batteries for each, and they are so connected that, while one set is in use, the other is being recharged.

Above the transmitting station at Arlington there are several antennæ that radiate from a central tower, like the spokes of a wheel. The switches that make the connection with these antennæ are located in the remote-control office. They are so arranged that when an operator wishes to tune in for any distant station, he selects the antennæ that most nearly points toward that station, and throws in the proper switch. It is possible to work with any one of the antennæ in either booth.

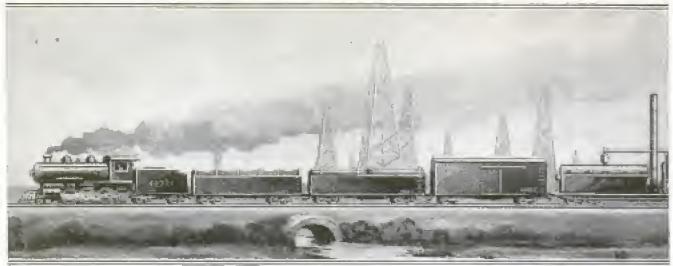
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EXPECT TO BUILD HUGE STEEL-

Plans are already well under way for the erection of a large-capacity iron and steel works and rolling mill in India. The plans call for the use of the most modern improvements and labor-saving devices. Iron ore of high quality, suitable fluxes, and excellent coking coal occur close together, and in large quantities. This condition, in connection with the low-priced labor available in India, should contribute to the production of steel at a remarkably low figure.

Indian for title &

9612 dnv. J. W. Dowell, Mallas, Leras



The Portable Oil Relinery as It will Appear When Moving to a New Oil Field: The Different Units are Built on Spe Quarters for the Operators. The Capacity of the

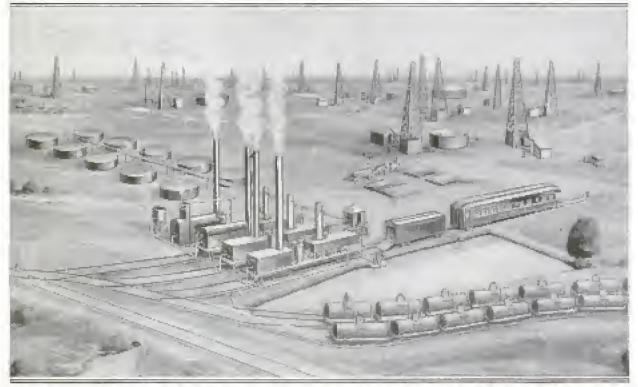
#### PORTABLE REFINERY FOR USE IN NEW OIL FIELDS

By CURTIS VINSON

A CRUDE-OIL refinery that moves on wheels from one field to another is the recent invention of an oil man of Dallas, Tex. The inventor has been in the business for years, being associated in the industry with his three brothers. Application for patent rights on the new invention has been made jointly by the four brothers.

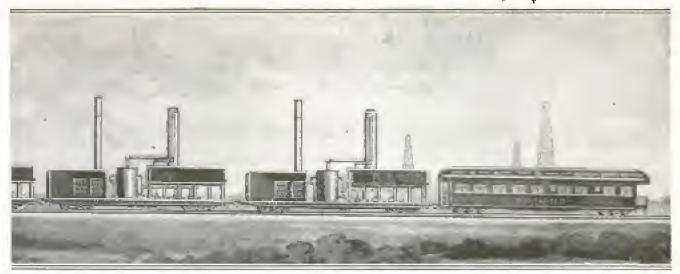
The portable refinery is designed to meet the needs of new oil fields where pipe-line facilities are lacking. It will supply the pioneer producers with a market for their oil while the big companies are laying lines to the field and independent refiners are building plants. Units of the portable refinery are built on specially constructed steel flat cars, 65 feet long and built to carry loads of 110,000 pounds each. These cars are mounted on six-wheel trucks and are specially constructed and insulated.

The first refinery of this type is now being built at East Chicago, Ind. This particular plant has three stills, with an estimated daily capacity of 4,000 barrels,



After Arriving at the New Oil Field, the Cars Carrying the Stills are Run on Parallel Switch Tracks and Connected Up, and the Refinery Is Ready for Business

- 9612



cial Flat Cars, and There Are Also Tool and Equipment Cars in Addition to an Office Car Arranged to Provide Living Refinery may be Easily Increased by Adding More Units

Each car is a separate unit, and plants of this type can be built to any required capacity by adding more units. In addition to the cars carrying the stills, the plant includes a tool car, and an office car, which latter is equipped with sleeping and dining quarters for the men who will operate the plant. A standard 60-horsepower boiler is used for supplying power to the plant when it is in operation. When set up in the oil fields, the stills are run, on parallel switch tracks

and are then connected, and the work of extracting gasoline, kerosene, and other petroleum products begins. It is estimated that such a plant can begin operations in a new field within 10 or 15 days after oil is first found. When its activity in one field is finished, it can be readily moved to another field, thus eliminating the loss sustained by stationary refineries when they are forced to close down because of the exhaustion of the oil supply.

#### PRIVATE WIRELESS STATION OWNED BY EIGHT FIRMS

Eight business firms of Minneapolis have decided to cooperate in the erection of one of the largest privately owned radio stations in the world, according to recently announced plans from that city. The broadcasting station will have a 500-watt transmitter and the biggest antenna to be found in the northwestern part of this country. An elaborate studio for the entertainers, connected to the broadcasting station by means of the usual microphone and cables, will also be included in the project.

#### HEEL-PEDAL CONTROL PLACED ON ELECTRIC AUTOS

Heel pedals placed close to the front of the driver's seat are the latest addition to up-to-date electrical coupés, and were demonstrated at the recent auto show in New York City. By simply shifting the foot, which is usually kept on the forward control, to the heel pedal, the car is thrown in reverse without any danger of stripping the gears, thus making it a comparatively easy matter for an inexperienced driver to handle a car correctly.



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Electric Coupé with Door Open Showing, Close to the Seat, the Heel Pedal Which Reverses the Car without Shifting Any Gears, Thus Eliminating the Possibility of Stripping Them.

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The Garvin machine Co.

Spring & Parick St.

420 POPULAR MECHANICS

INTERNAL-GRINDING MACHINE FOR QUANTITY PRODUCTION

For the rapid and accurate grinding of straight, round holes of from 1 inch to 4 inches in diameter up to 4 inches deep, an internal grinder of original design has recently been placed on the market. Its outstanding



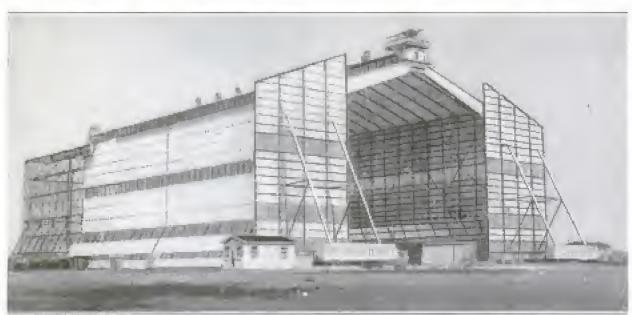
Internal Grinder for the Accurate Grinding of Straight, Round Holes on a Production Basis

feature is the revolving and reciprocating of the work-carrying spindle in one

caring, thus eliminating the necessity If its exact alinement with other essenfial parts of the machine. The work spindle as well as the grinding-wheel spindle are vertical, and the latter, which is appermost, is directly driven by a motor having variable speeds of from 7,500 to 12,000 revolutions per minute. A separate motor at the rear of the machine drives the work and the feed mechanism, which are under control of speed and stroke-change handles. The operating control of the machine by a hand lever is very simple, a single movement forward or backward throwing the machine into its work position or out of it. The machine occupies a floor space of 20 by 45 inches, and weighs 1,250 pounds.

# GIANT HANGAR FOR AIRSHIP COMPLETED IN TEXAS

The huge airship hangar at Brooks Field, Tex., has just been completed, but is without a tenant. The structure was intended for the ill-fated "Roma" that was destroyed in February of this year. The building has a clear height of 125 feet, and is 450 feet long by 125 feet wide at the base. Each of the sliding doors weighs 360 tons, and is supported on two six-wheeled trucks. A five-horsepower motor is used for opening and closing each door. The sides of the building are of corrugated asbestos with three rows of wire-ribbed glass panes for lighting., The roof is of gypsum base, covered with felt laid in asphalt. A solid concrete floor extends under the entire building.



This Great Airship Hangar at Brooks Field, Texas, was Intended to House the Ill-Fated "Roma." The Building Is of the Most Approved Construction, and Has a Clear Height of 125 Feet

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# Lewis F. Bulcher, State architect, albany, hy

9476



One of the Fireproof Dormitory Buildings of New York State's Great New Hospital: The Building Is of Brick, Steel, and Concrete Construction, Even the Floors Being of Concrete Covered with Lincleum, Large Airy Rooms, Wards, and Broad Screened Porches are Provided for the Patients

BUILDING A \$10,000,000 HOSPITAL
BY CHARLES MARTEL NILES OF A

O NE of the largest and best equipped hospitals in the world is now under construction at Marcy, N. Y. The institution stands on a plateau overlooking the beautiful Mohawk Valley. It will be a city in itself, with its own water-supply system, power plant, streets, and sewers. This great hospital, which the state of New York is building at a cost of \$10,000,000, will accommodate from 3,000 to 5,000 patients, in addition to physicians, nurses, and other employes. Free treatment will be given to men and women who suffer from mental and nervous troubles.

Everything has been planued to promote the health, safety, and comfort of the patients in the most efficient and eco-The institution will nomical manner. comprise 48 different buildings, some of which will be connected by inclosed passageways. The three principal hospital units are of imposing size and massive, construction. The main building, where the most severe cases will be treated, stands in the center of the group, flanked on the east by an immense dormitory for chronic male patients, and on the west by a similar building for chronic female patients. Behind each of the "chronic" buildings will stand a semicircular group of six "cottages," each of which will house 100 patients. There will be a separate dining hall for every three cottages. Food will be prepared in a large central kitchen,

In the rear of the main building will stand a large assembly hall for lectures and entertainments. The institution will have a fully equipped launder. There will be a nurses' home, and a home for the other employes. Two large shops will furnish occupation for the hands and minds of patients who are well enough to work. Separate dwellings will be erected for the superintendent, chief engineer, and steward. The mammoth power plant will be located in the rear of the other buildings, near a convenient railroad siding.

The hospital grounds cover more than a square mile and include a fine farm, which will supply fruits, vegetables, eggs, poultry, pork, and dairy products. Macadam roads and concrete walks will

traverse the grounds.

All buildings will be constructed of brick, steel, and concrete, absolutely fireproof. Roofs will be of slate or tin. The main and chronic buildings will be three stories in height and measure 100 by 300 feet on the ground. They will contain large, airy, well-lighted wards, as well as cheery and comfortable private rooms. Each building will be provided with living quarters for the attendants, and an apartment for the resident physician. The floors will be of concrete, covered with linoleum. All heating and plambing fixtures will be hung from the walls, leaving the floors unobstructed. screened porches will adorn the front of the principal buildings, making a safe place for the patients to enjoy fresh air and sunstrine.

An abundance of water will be procured close at hand. A massive concrete dam, 500 feet long and 40 feet high, has

marcy Slinsin thica spital

#### POPULAR MECHANICS



This Gives a Good Idea of the General Arrangement of the Institution's Water-Supply System; the Storage Reservoir Is at the Right with the Filter Beds and Pumping Plant in the Center. Powerful Pumps will Raise the Water to an Elevated Service Tank

been built across Crane Creek, which flows through the hospital grounds. The reservoir thus formed will impound about 45,000,000 gallons of water—three months' supply for the hospital. Before being used, all the water will pass through filter beds located in the gorge below the dam. Powerful pumps will lift the water to a tower tank, 160 feet above the highest point on the grounds. The tank has a capacity of 150,000 gallons.

The power plant will be a marvel of mechanical engineering. The big steelframe building will provide space for the installation of eight 500-horsepower water-tube boilers. Coal will be dumped from railroad cars into a receiving hopper, from which a belt conveyor will carry it to the crusher. A bucket conveyor will elevate the coal from the crusher house to the top of the boiler room.

All the buildings of the institution will be heated from the power plant by means of a forced hot-water system. In addition, the power plant will be equipped with three dynamos having a combined



This Central Power Plant will Furnish the Big Hospital with Light, Heat, and Power. The Most Modern Mechanical Appliances will be Used for Handling the Coal and Ashes

capacity of 500 kilowatts. Power will be furnished for the refrigerating plant in the storehouse. Hot water for domestic uses will be piped from the power house to all buildings where it is needed. One end of the big building will be fitted as a machine shop and garage.

There will be over four miles of separate storm and sanitary sewers on the grounds. The sewage will be conducted to a disposal plant at the foot of the hill, where it will be treated by the most modern methods and converted into fertilizer

as a source of saving or revenue.

#### 730 FLYING FISH FOUND TO HAVE BEST SOARING WINGS

By studying the wing structure of flying fish, a scientist, who is an authority on the flight of birds, has found that

their wings are some four or five times as efficient, for soaring flight, as the wings of birds, He attributed this to the fact that the fin rays formed projected ridges on the under surface of the wings. By experimenting with models fashioned on similar lines, he found that the fin ray caused a sheltered area to appear back of the ray when the model moved through the air. His conclusion that this sheltered area acts as a force to drive the wing ahead when soaring. It seems that the exact shape of the rear portion of the fin ray has little effect on the soaring ability. also believes that atmospheric conditions largely govern soaring

christian of cience mone

#### flight 4769 TWO METHODS TO PRESERVE DECAYING SANDSTONE

To preserve sandstone against decay, two methods have been suggested that have proved effective. If a piece of rotten sandstone is treated with certain chemical compounds of alcohol and silica and then exposed to moist air, the silicais deposited and forms a protective cement coating. Lime wash has also been found very effective for the same purpose.

The construction of this great institution has been in progress for over three years. At times the number of men employed exceeded 800. The present construction program will provide for the care of 3,000 patients, but the hospital can be expanded to accommodate 5,000 without much additional expense, as the principal service units have been designed The facilities with that object in view. and conveniences provided for the patients The Marcy are almost innumerable. The Marcy Hospital will, indeed, be a splendid example of man's humanity to man.

#### MODÉL OF BRITISH FLAGSHIP ON AMERICAN AUTO TRUCK

In a recent naval parade in England, a well-known light American automobile, converted into a truck, was used to con-



Full-Rigged Model of Lord Nelson's Famous Flagship "Victory," Conveyed by Auto Truck in a Naval Parade Recently Held in England

vey a model of Lord Nelson's famous "Victory." The model was flagship about the same length as the truck, and was supported by a platform above the heads of the passengers. It was a very complete reproduction of the ship, fullrigged, with sails set, and the flags flying that denoted Nelson's famous signal at the battle of Trafalgar, "England Expects That Every Man will Do His Duty."

The average time required by a ship to find its position by means of the present system of wireless telegraphy, is five minutes.

The En geneer 6/16/22

POPULAR MECHANICS Proper City 7.1

STRONG SWIMMER TOWS BOAT WITH SEVEN PASSENGERS

An English swimmer who is planning an attempt to swim the Channel, performs an unusual stunt, to show his power in



This English Swinding, Who will Attempt to Swim the Channel, is Here Seen Towing a Small Boat Containing Seven Persons

the water and as a means of developing his endurance. Using a canvas harness and a short length of rope, he tows a small boat containing seven persons a distance of a mile. As a demonstration of strength and endurance the performance ranks high. OF RADIO VACUUM TUBE

One of the most remarkable developments growing out of the widespread interest in radiotelephony, is the construction of an apparatus for making sound vibrations visible. An adaptation of the vacuum tube is the basis of the new anparatus, and one of the most striking advantages is that it overcomes the lag occasioned by the mechanical inertia of devices formerly used for this purpose. The new tube is pear-shaped, about 8 inches long by I inch diameter at the socket end and 4 inches at the other end. The large end of the tube is covered with a fluorescent screen. The filament is about 1/4 inch long. Four platinum plates around the filament direct a beam against the fluorescent screen. The current fluctuations caused by sound vibrations cause this beam to move up and down the screen with great rapidity, and it is then possible to record these movements in the form of a moving-picture film.

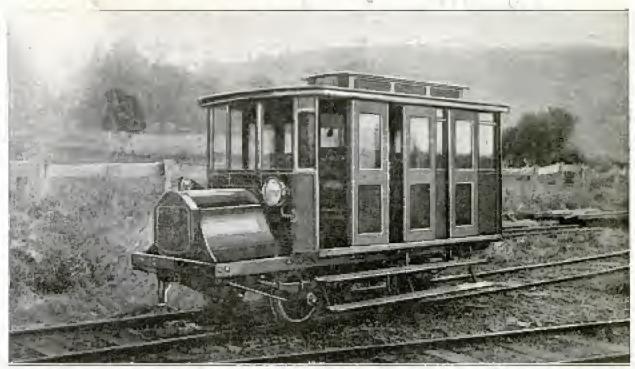
# TO EQUIP ALL FLYING FIELDS WITH AERO AMBULANCES

Because airplane ambulances have proved so efficient in transporting injured persons, the War Department has ordered all flying fields in the United States to be equipped with them. The type of ambulance chosen is the one that was shown and described in the November, 1920, issue of this magazine, at the time it was first tried out. There is room for two stretcher patients in the fuselage. The physician's cockpit is located just in front of this compartment, so that he can observe the patients at all times,



This Is the Type of Airplane Ambulance, with Room for Two Stretcher Patients, That has been Chosen by the War Department to be Used at All Flying Fields in the United States

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One of the Strange-Appearing Railway Cars That are to be Seen along the Rights of Way in Australia: These Conveyances, Which Resemble Oversize Toys, are Equipped with Special Gears to Enable Them to Climb Steep Grades with Ease

#### RAILWAY CARS IN AUSTRALIA PRESENT STRANGE SIGHT

Strange-appearing motor cars for handling passenger traffic are to be seen on some of the railways in Australia, one of these having a seating capacity of but 12 persons. Designed to negotiate steep grades, this odd conveyance, which is equipped with a 15-horsenewer four-cylinder engine, chugs merrily along the right of way at the none too startling speed of 12 to 15 miles per hour.

## FREE TELEPHONES INSTALLED

No more will the distressed motorist in Pennsylvania be required to trudge wearily for miles back or ahead of his broken-down machine for the purpose of asking aid from the nearest garage. The Highway Emergency Service Company of that state has placed, at intervals of approximately one mile, telephones in special boxes which are mounted on poles at the roadside. These boxes are painted white, having in black lettering the distances in miles to the nearest towns, so that the traveler-tourist can see just where to call for help. Locks are placed on the boxes, the keys for which can be had by anyone at a small fee per year, or in the event of a stranger motoring through the state, a key can always be obtained at the house nearest to a box. Long-distance calls can be made where the called party agrees to pay the charges, all other service being free within



Left: Close-Up of the Telephone Box, Showing the Lettering, Right: Box Shown Mounted on Pole at the Side of the Highway

the zone of the exchange making the connection.

Passengers in an automobile equipped with a concealed radio outfit, distinctly heard a musical concert and the returns of a prize fight while enjoying a ride along the boulevards of New York City recently. "Listening in" was accomplished with the usual head set and a loud-speaking horn, the absence of a visible antenna and ground being the principal features.

Harristell g, Pa

Christian & cienco OPULAR MECHANICS litter allac PORTABLE GRINDING MACHINE NEW HOUSING PLAN COMBINES

THE LUXURY AND LOW RENTS A portable grinding machine that can be handled by one man has an independ-

OPERATED BY ONE MAN

To relieve the housing shortage, and reduce the existing high rents in New



Pertable Grinding Machine with Motor Attached, That can be Operated by One Man: It can be Moved and Used in Any Part of a Factory

ent motor at one end, and the grinding wheel at the other end, of a long horizontal frame. In connection with a trolley running on an overhead beam, is a block and tackle from which the grinder is sispended in balance, so that it can be raised or lowered, and swung into any position, thus proving a valuable and flexible agrangement for any factory. 9494

York, a bill has recently been passed by the state legislature that permits insurance companies to invest up to 10 per cent of their assets in apartment-house construction. Taking advantage of this. the Metropolitan Life Insurance Company is about to erect three blocks of houses in Long Island City, and one in Astoria. The project is intended to combine beauty and comfort as well as economy. Each block of houses will have a large interior court. and every room will have an outside expo-There will be interior gardens with a lawn common to all ten-These first four ants. blocks will house 1,950

families, in apartments of four, five, and six rooms and bath, and by the law the average rent of each room may not exceed \$9 a month.

■There has recently been discovered near Dryden, Ontario, an extensive deposit of soapstone, which occurs on a low ridge only 500 feet from the railway.

#### CLEVER WINDOW DISPLAYS FOR FISHING SEASON

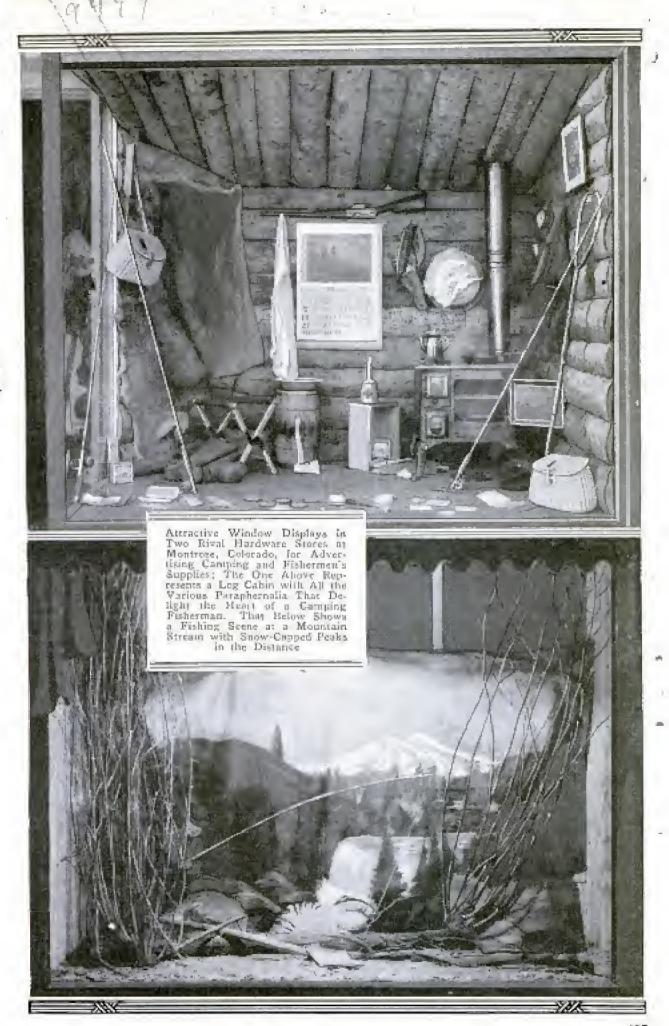
Two clever window displays were shown recently by rival hardware merchants at Montrose, Colo., in advertising their camping and fishermen's supplies.

One was a representation of a mountain cabin made of spruce logs. In the cabin were the usual settings, including a stove, skillet, coffeepot, fishing supplies, camp stool, keg, and washbasin, firewood, hand ax, rubber hoots, hunting knife, etc. On the walls were an alarm clock, a jumper, an old rifle, revolver with holster, dishpan and cloth, fish basket, deer-hide towel, and a calendar on which the opening day of the fishing season was circled with red crayon. A candle in a bottle was on a box near the stove, burned biscuits in a pan under the stove, a pan of nicely, browned biscuits in the oven, and eggshells, and other miscellaneous articles were strewn on the floor in a very realistic manner.

The other display showed a fishing scene along a mountain stream. In the distance were snow-capped mountain peaks, while the course of a mountain stream could be followed down a cañon. in which spruce and aspen trees were seen. An old cabin was visible through the trees, near a waterfall. In the foreground stood the effigy of a man with a lishing rod, in the act of pulling out a The bank of the stream was strewn with sand and gravel.

The two displays created much attention and materially aided in stimulating the trade of the merchants who made them.

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Johnson Isas appliance Co ceaar Rapids, d'ava-428, POPULAR MECHANICS

#### GAS-FIRED MELTING FURNACE HAS THREE BURNERS

For the smaller shops, a low-priced furnace for melting soft metals is now being



manufactured that has several noteworthy fea-tures. The removable castiron melting pot holds 150 pounds of metal, and is heated by three special gas burners. Each burner has a shut-off valve and pilot light, and no auxiliary blast or blower is required. Two burners develop suf-

ficient heat for keeping the metal in a molten state. Regulators are provided that can be adjusted for different pressures or qualities of gas.

#### OLD SHELLS FOUND USEFUL 3583 AT U. S. NAVAL STATION

With partial naval disarmament assured, condemned shells are being put to a constructive use at many U. S. Naval Stations. At the Naval Proving Grounds, Md., 12-inch shells are

now used as buffer guides to keep trucks in the right path in entering the garage. As they are set to a depth of about a foot in concrete, there is little danger of a truck striking the building. At the same station, other shells are used at street intersections as curb markers to keep careless drivers from injuring the grass.

#### SIGN MADE OF INLAID GLASS GIVES ARTISTIC EFFECT

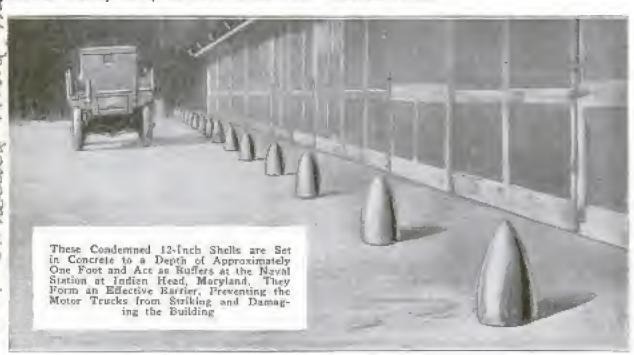
Representing a swan floating on the water, a sign constructed of inlaid glass



has been ce> mented into one of the stone pillars ornamenting the automobile entrance of the grounds belonging to a club at Schroon Lake, N. Y. The sign, the work of an artist, is made. of varicolored glass in the

same manner as the ornamental church window, and yields a beautiful effect.

Reckless auto drivers are to be called "flivver-boobs" according to the judges in the American Automobile Association's contest to pick the best name for the reckless driver.



9322 hatimal marking machine Co

Concessade Charles of the Concessade Charles

The Worker in the Center of the Reel Hangs the Identification Pin on the Proper Rod, and the Clothes Slide to the Outer Edge of the Reel to be Removed by the Checkers and Wrappers. This System Greatly

Facilitates the Operation of Sorting, and Also Effects a Considerable Saving of Ploor Space

9322

#### REEL FOR ASSORTING ROUGH-DRY WORK IN LAUNDRY

In laundries handling any quantity of rough-dry work, the problem of sorting the clothes for the different bundles is a serious one. To facilitate this work and also save floor space, an assorting reel has been devised in which the identification pins are slipped over inclined bars that carry the various garments to the outer edge of the reel, where they are removed by the checkers and wrappers. The worker doing the sorting stands on a circular raised platform in the center of the reel and can reach any of the inclined bars with but little moving about.

#### ITALIAN LOCOMOTIVE SHEDS WITH ASBESTOS ROOFING

Protection against the destructive influence of smoke and gases from the locomotives is provided in a series of reinforced-concrete engine sheds recently built at Milan, Italy. The structure is 656 feet long, 314 feet wide, and is divided into five longitudinal bays, two on either side of the central one, which is 79 feet wide and 46 feet high. The roof framework, like the rest of the building, is of reinforced concrete, and the roof covering is composed of asbestos-cement sheeting, with steel-framed glazed lights.

#### TRAFFIC SIGNAL HAS SPIKES FOR CARELESS DRIVERS

Traffic signals mean nothing to some motorists, but one of these recently installed in Central Park, New York City, possesses numerous "pointed reminders." The usual red and green lights are incorporated in an artistic cement pedestal, in the base of which are set sharpened and protruding spikes that mean ruin to any tire driven against them,



Tradic Signal Which Has Sharp-Pointed Spikes in the Base as a Reminder for Careless Motorists

Who Disregard the Lights

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F. Paul, Celdy BOPULAR MECHANICS BLA

hula 34 SHOWER BATH SPEEDS UP JOB OF WASHING MOTOR BUS

Because the patrons of motor busses insist that these conveyances be kept spick and span, the washing problem is



The Motor Sus is Driven into the Space between the Two Banks of Spray Pipes and Receives a Thorough Washing in a Few Minutes

one that cannot be ignored. As a means of speeding up this task, one of the London motor-bus companies has built a shower bath by means of which a bus can be washed very quickly. Spray pipes on either side direct streams of water against the bus, while a pipe above it can he lowered to wash the top.

#### COPPER HORSESHOES TO HELP PREVENT FOREST FIRES

Copper horseshoes as a means of preventing forest fires have recently made their appearance in several of the national

> forests of the West, and, if the plans of certain forestry officials are carried into effect, this metal will supplant steel upon the hoofs of all horses to be used on public domains, where there is any measure of fire hazard.

> According to the supervisor of the Angeles National Forest, in southern California, steel horseshoes used in flinty mountainous regions may have been the cause of some of the mysterious fires that have started in the forest reserves. Heavy steel horseshoes striking against flint or hard granite may readily be the source of sparks, which, falling into dry grass or other inflammable material, would quickly cause it to burst into flames if fanned by a breeze.

> The new horseshoes were given their first try-out recently in Calaveras County, Calif., when a motion-picture company sought permission to use the Calaveras National Forest as the background for making a film which called for the employment of a large number of horsemen. Permission to so use the forest was granted on condition that all the horses to be used should be shod with copper. The film was made, the horses being shod with shoes

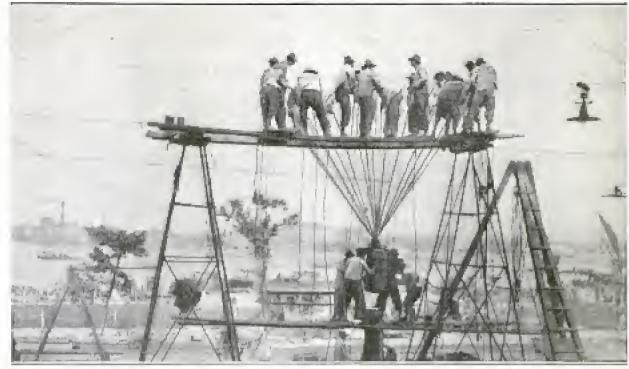
made from copper alloyed with tin, to give the desired degree of hardness. This metal produces no sparks when struck against flint or other rock, and is said to wear quite as well as horseshoes of steel or iron. The cost, of course, is somewhat higher, but the prevention of one small

fire more than offsets this.

#### SINGING LEADERS SPEED CHINESE PILE DRIVERS

No visitor to Cliina who once hears it ever forgets the chant of the pile-driver coolies. The lilting chorus that has come down through the ages and was sung by the toilers who built China's great wall, still is raised over every piece of construction work that brings into service this particular guild of workers. Ordinarily, contractors employ singing leaders with each gang of pile-driver coolies, and while it is the particular function of these leaders to speed the work, they also extemporize words for the ancient chant, often at the expense of the foreign onlooker.

From the hammer of the human pile driver, which may weigh several hundred nounds as many as a score of ropes run



These Coolies are Working on Shanghai's First Sewer System, Singing, as They Work, the Ancient Pile-Driver Chant under the Leadership of a Special Oversect

to as many workers stationed above on a staging. As the coolies heave in unison, lifting the hammer, the chant is begun by all the workers, and with each line of the song a blow is delivered as the hammer is dropped. Other coolies below control the movement of the hammer which rises and falls more and more rapidly until a swelling climax is reached with a shrill outburst from the throats of the workers.

#### FOUR-POINT CAR SUSPENSION-CHANGED TO THREE-POINT

For converting a car with a four-point frame suspension into three-point suspension, an accessory that also acts as a compensating spring and a shock absorber, is now on the market. The device consists of a six-leaf semielliptical spring that is fastened by a shackle and auxiliary spring, at each end, to the front axle of any passenger car. Pivotally attached to the center of the elliptical spring, and directly above it, is a cylindrical crossbar, the ends of which engage steel flanges



Three-Point Suspension Device: The Shackles on the Ends of the Spring Connect to the Axle, and the Cylindrical Crossbar Above Connects to the Car Body

projecting from each side of the base of the car body. This pivotal suspension of the front end of the body keeps the car



Three-Point Suspension Accessory as It Appears When Attached to the Front End of an Automobile

always level transversely, no matter what the position of the wheels may be, and the action of the shackle springs makes a shock absorber unnecessary.

#### USE ENAMELED UPHOLSTERING NAILS TO MAKE FLAG

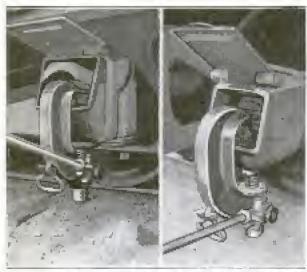
An enterprising Minneapolis firm presented something new recently in the way of a flag display. The face of the United States flag was composed of 2,797 enameled upholstering nails. The gold fringe was made of 386 copper nails, placed on three sides. The 48 stars were represented by 144 white nails, and the blue field by 487 pails. The 13 stripes were composed of 841 white and 939 red nails. The nails were inserted into a fiber doormat which was used as a base for the flag.

Joyce- Cridland Co.

132 Jan POPULAR MECHANICS

## NEW TYPE OF JOURNAL JACK IS SIMPLE AND COMPACT

Designed for use in the inspection of journal boxes and the rebrassing of journals in all classes of railroad freight



Two Views of Jack That does Not Touch the Ground: Its Head Clamp is Applied on the Journal Collar, and can be Used on Any Standard Journal

and passenger cars, a new clamp type of jack operates without having to touch the ground. It is applied on the axle collar, thus holding the wheel firmly down against the track. Only a short rise of the screw is required to lift the journal box sufficiently to remove and replace the brass, and only one size, as the head cap is adjustable and the jack can be used with any standard journal. The ratchet operates so easily that a 24-inch lever suffices to give the needed power, making it very handy at close quarters.

#### SUPPORTING RIG FOR HORSE IN WEAKENED CONDITION

After an exceptionally hard winter in North Dakota, a farm horse was reduced to such a condition that if it fell down

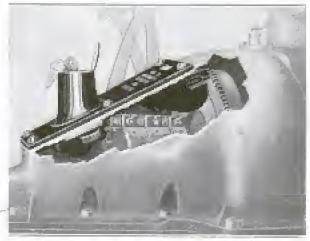


Four-Wheeled Rig Carrying a Strong Bellyband That Allows a Horse in a State of Exhaustion to Feed on the Prairie without Danger of Falling

it could not get up again. It was thought that, after a few weeks' feeding on the prairie, the horse would recover its strength, so the farmer made a four-wheeled rig with a frame and supporting brackets that carried a strong bellyband, in which the horse was slung to prevent it from falling. The horse could get its mouth to the ground and could wander over the prairie at will.

#### AUTOMOBILE LOCK REPLACING TRANSMISSION-CASE COVER

As a protection against automobile thieves, a positive lock is now available for use on a popular car. It replaces the regular transmission-case cover, and projecting from it, just above the floorboard near the brake pedal, is a small tube containing the keyhole. A quarter-turn of the key causes a steel forging, which is snugly housed below the cover, to slide so that teeth on its end mesh into the ring gear of the flywheel. At the same time an iron arm is caused to slide under



Lock That Replaces the Transmission-Case Cover on a Low-Priced Popular Car, and Blocks the Flywheel

the edges of the transmission case, making it impossible to remove the lock, even if, its connecting screws are taken nout.

AMERICAN COAL-MINING FILM

A motion-picture film, "The Story of Coal," made by the Bureau of Mines, is to be shown in Czecho-Slovakia and Jugo-Slavia. It has been exhibited extensively in this country, and was recently widely circulated in India. It seems destined to carry the story of American coal-mining methods to all parts of the world and should act as a trade stimulator for the sale of mining machinery.

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Extracting the Oil of the Eulachan, That Is a Substitute for Butter among the Natives of British Columbia: At the Left Are the Bins in Which the Fish are Left to Soften. To the Right Are the Vats in Which the Oil is Extracted by Heat from the Softened Fish

# THE FISH THAT TAKES COW'S PLACE BY FRANCIS DICKIE HERE

MARCH is the month when the Indians on the British Columbia coast put up their butter for the entire year—and it is gathered from a fish, which appears only once a year, for about three weeks' time. It sounds ridiculous to tell of a butter-giving fish, but that is actually what the culachan, or candlefish, is, for the fats derived from it serve the Indians as an equivalent for the life-sustaining material which Anglo-Saxons get out of butter, and Italians and the people of the south of France out of olive oil.

The eulachan is the Indians' most precious fish, and is quite as mysterious in its ways as the much told-of salmon, Like the latter, it comes yearly from the unknown deeps of the Pacific and goes up fresh-water rivers along the Pacific coast. On the Columbia the run is in February; farther north, it lasts from two to three weeks in March. The culachan of the Nass River is said to produce the best oil; but perhaps it is that the people there are more expert at extract-The fish swim in a thin line, the first layer close to the bottom-a wonderful sight, Unlike the salmon, the eulachan goes back to sea after spawning; at least that is the supposition, since no dead fish are seen later, as in the case of the salmon. The culachan is from 6 to 8 inches long, a silvery fish that is almost pure oil.

The Indians are on the lookout for the beginning of the run, and take millions of the fish in nets; some, too, are caught with a long pole with a line of very sharp thin spikes, like the teeth on a comb. This pole is passed through the water, as one would a paddle, and the fish are caught upon the sharp spikes.

The fish are dumped in great bins of cedar logs and left to soften. As the weather is usually cold at this time of the year, this softening process, though really a sort of decaying, has no bad effects on the product. It simply makes for easier rendering of the fat later. Of course, great care must be taken not to let the process go too far, which would result in rancid oil and grease. Eulachan grease, when well made, has no taint of fishiness,

When the culachan have softened from a week to 10 days—or other periods, a great deal depending on the weather—they are transferred to great vats and hoiled in hot water. The Indian method of heating the water is to drop hot stones into the vats; and though this is a much more laborious way than boiling in modern kettles, many of the Indians to-day, though they have adopted the white man's phonographs, drag saws, motor-boats, etc., still stick to this method. They claim that the grease produced in their own way is superior in flavor and

#### POPULAR MECHANICS



Some of the Large Cedar Boxes into Which the Oil of the Eulachan, after Extraction from the Pish, is Poured:
It Hardens into a Lardlike Substance, and Is Then Ready for Use or Shipment. Some
of the Fish are Also Shipped after being Smoked and Dried

texture to that boiled in the white man's way. And this is true, A parallel may be cited in the old and modern ways of

making maple sirup.

The oil is skimmed off and transferred to water-tight cedar boxes of remarkable make. The joining done on these is very fine work. Into the boxes the grease is poured and soon hardens, taking an appearance very much like good lard. It is also kept in the liquid state, and I have seen it used on porridge by many natives. The eulachan butter is used in cooking, as cow's butter is used by white people. And, he it noted, there is just as wide a variety of eulachan butter as there is of cow's. The best quality is pleasant-tasting, without rancidness, and keeps this way for 12 months. Strong culachan

grease results from too much or too little boiling, or from leaving the fish too long in the sun. Among the Indians of British Columbia certain tribes were noted for their culachan grease, and for hundreds of years they traded it with Indians of the interior for various products they did not themselves possess.

The fish are also smoked and dried; but it is as a producer of a staple fat they are most valuable, or rather invaluable, to the natives of the Pacific coast. Oddly enough, though these fish have been taken by the Indians for centuries, it is only in the last five years that the fish have been taken commercially by the white man, and as yet in very small quantities. Today they are sold fresh in small quantities in Pacific coast cities.

# MAKING INDIVIDUAL ICE-CREAM 9(10BRICKS AS REQUIRED

The popularity of individual bricks of dipped ice cream has resulted in the in-



This Soda-Fountain Device, Forced into a Container of i.e Cream, Forms a Small-Brick Ready to be Dipped

vention of a device for shaping the ice cream at the soda fountain as required. The forming case is forced into the ice cream and then withdrawn, and the small brick is then forced out of the case by a plunger and spring. It can then be dipped, wrapped, and handed to the customer, the entire operation taking only a few moments. One of the advantages of this system is that the customer may order any flavor of ice cream desired.

●Our Bureau of Information will answer all questions regarding articles appearing in this magazine.

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Sciences/22 Hawaiian Stredger Co Sciences/22 Papular MECHANICS HASS

#### AGENCY TO SEND LITERATURE TO RUSSIAN SCIENTISTS

Because of the many appeals that have come from Russian scientists for recent

literature of a scientific nature, a committee has been formed in this country that will attempt to meet the requests of these men, who have been almost completely cut off from such literature since 1914. The committee will work in conjunction with the American Relief Administration and will collect and cause to be forwarded, scientific books and periodicals, authors' reprints, publications of scientific burgaus, and other technical information that has appeared in this and other countries since that year.

#### MAKE FILTER FOR CATCHING FINE POWDERED GLASS

Annoyed by the clogging of the water pipes leading from the trough in which a manufacturing optician's grindstone revolved, a young mechanic of Sheboygan, Wis., has developed a filter that catches the finely powdered glass and stops the trouble. While no details of the construction can be given at this time, it is stated that the filter consists only of a



This Is a Block of Finely Powdered Glass, Caught by a Filter Placed in the Water Pipes Leading from an Optician's Grindstone

series of pipes and baffle plates. It has been found that the powdered glass that is trapped makes a good polishing agent for materials other than glass.

Word comes from Australia of the discovery of a process for the extraction of copper from low-grade ores. It is said that oxidized ore containing as little as two per cent copper can be treated at a 170 fr.

## DREDGING OUTFIT CUTS CANAL ON 7 7 ACROSS BOULEVARD

Cutting a canal across the picturesque and palm-lined Kalakaua Avenue at Hon-

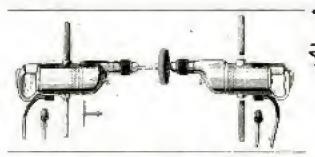


Palm-Lined Boulevard in Honolulu as It Appeared After the Large Dredger had Partially Completed the Task of Cutting through the Pavement

olulu, in the Hawaiian Islands, was the unusual task recently assigned to a dredging company. The draining of marshes in the vicinity of Waikiki caused the waterway to be constructed through the beautiful boulevard, thereby intergupting all traffic, which, however, will soon be accommodated as usual by the erection of a temporary bridge.

# COMBINED DRILL AND GRINDER HAS WIDE RANGE OF SPEED

A recently developed combination electric hand drill and grinder is so constructed that, with the use of one motor, the speed can be varied to suit either drilling or grinding. The ½-horsepower motor is of the universal type that can be operated by either alternating or direct current, and the speed change is of simple design. Its drilling capacity is ½ to ½-inch steel, and it has a 6-inch grinding wheel. The complete tool weighs 18 pounds.



Combination Electric Tool, Shown in Use as Both a Drill and a Grinder: With One Motor Its Speed can be Changed to Suit Either the Drill or the Grinder

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and Elepartment.

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POPULAR

DAMAGED SIDEWALK REPLACED WITHOUT DISTURBING IT

In laying a new cement sidewalk without removing the old one, a scries of steel reinforcing rods, spaced a few inches



Laying a New Sidewalk on Top of an Old One: When the Steel Reinforcing Rods are Laid in a Thin Bed of Gravel, the Cement is Poured and Suitably Finished

apart, were laid across the top of the old sidewalk and buried in a layer of fine gravet. The cament was poured onto this and smoothed down to the required level, giving to the old sidewalk a new surface that will not crack and that is of a permanent nature.

#### TRANSATLANTIC TELEPHONY SOON TO BE ACHIEVED

Telephone conversations between New York City and London, or Paris, are predicted as a common occurrence within a few years, due to the recent successful experiments with the electron tube. A set of these tubes of exceedingly high power is being installed in the great wireless station at Carnarvon, in Wales, England, while an even more powerful set is ready to be placed in the mammoth station at Port Jefferson, Long Island, in this coun-These tubes will first be tested in wireless telegraphy as the dot-and-dash signals are the most simple sounds to transmit, and as their development progresses, they will be used in the attempt to send the varied tones of the voice across the thousands of miles of water.

n.y. James 6/30/22

MECHANICS Unnifer NEW LIGHTWEIGHT ELECTRIC 9734 STORAGE BATTERIES

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W. a. S. Electrical m

Almost simultaneously, two storage batteries have been invented, one in Winnipeg, Can,, and the other in England,

which, if the claims of the inventors are valid, mean something of a revolution in all the uses of electricity which require the storage bat-tery. The Winnipeg bat-tery is of the ordinary sulphate type, but by incorporating the insulation used with the positive plate, the plate is made so much stronger that only one-third of the inactive metal is re-It is claimed quired. that this new construction makes it impossible? for the active material to leave the grid. At the same time it provides for the free circulation of the electrolyte. The net of result is that the weight of the battery, per unit of capacity, is reduced to one-third that of the ordinary battery. This,

means that the electric automobile, with all its simplicity, cleanness of operation, and balancing of weight, may become

The claims made for the English battery are that the output is increased per unit weight 300 to 800 per cent; that it will not sulphate, that it can be charged in 15 minutes, and that it may stand idle any reasonable length of time without deterioration. This battery is now being tested by the experts of the national laboratory, London.

The inventors of both batteries claim that the construction and assembly of the parts are very simple, and the entire battery is not costly. The commercial development of these two batteries will be awaited with interest.

# TRACTOR SPEEDS UP DIFFICULT

The erection of an addition to a bank building at Alhambra. Calif., recently, necessitated the removal of a large tree in the adjoining parkway. The tree could not be felled in the usual manner because it might damage surrounding property.

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After Pulling the Tree Out by the Roots, the Tractor with a Single Mighty Heave Rolled the Stump and Trunk, Weighing Four Tons, onto a Sledge. It Then Towed the Whole Load to a Local Woodyard, Accomplishing the Entire Task in 20 Minutes

Accordingly, the branches were cut off and hauled away until nothing was left but the main trunk and roots. The disbut the main trunk and roots. posal of this larger portion of the tree offered another problem. The trunk of the tree was about 20 inches in diameter, and, with the roots, weighed about four tons. The removal was greatly simplified by the use of a powerful endless-tread tractor. After workmen had dug around the roots to loosen the stump and trunk, the tractor was attached to the upper portion of the trunk with a heavy log chain. With a single mighty heave the tractor pulled the stump and trunk out. roots and all. The chain was then wrapped around the trunk, and by another pull of the tractor rolled upon a sledge previously placed for the purpose. The tractor then took the sledge in tow, and dragged the whole outfit to a local woodyard. The use of the tractor made the entire job the work of only about 20

#### FLICKERING OF CAR LIGHTS REMEDIED BY NEW SHOE

Fitting some 200 of their subway cars with a special shoe, was the means employed by the Interborough Transit Commission of New York City, to eliminate the annoying flicker of the car lights. The new shoes contain a spring which keeps them in constant contact with the third rail, and thus insures a regular flow of current to the lamps.

by Jimes 6/30/22

# FOR PACKING HOUSES

Skinning a steer of ordinary size in the incredibly short time of five minutes is possible with the use of an electrical tool invented by a Frenchman and recently introduced in a Paris packing house. The appliance has three small blades of clover-leaf design mounted at the end of a flex-



ible driving shaft, which is turned by a motor at a speed of 2,800 revolutions per minute, thus yielding a seemingly solid cutting edge for the worker.

Paris France

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#### CIVIC FEATURES THAT PROMOTE THE COMFORT



#### AND ENJOYMENT OF VISITORS AND RESIDENTS

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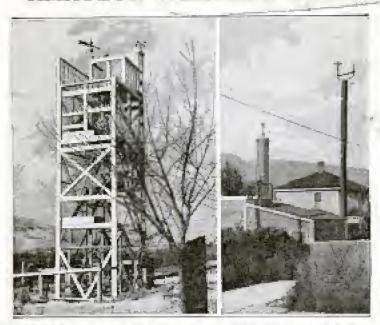
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#### POPULAR MECHANICS

#### AMATEUR WEATHER BUREAUS DO GOOD WORK



These Observation Towers have been Erected by Amateur Weather Prophets and Equipped by Them with Reliable Devices for Recording Atmospheric Conditions

Desire on the part of the owners to work with precise and delicate instruments as well as to compile useful and interesting data, with no other remuneration than the satisfaction realized in the accomplishment, has culminated in the construction of two well-equipped weather bureaus. Vanes, wind gauges, barographs, thermometers, sun meters, and rain gauges, all of the best quality, are part of the equipment. The amateur bureaus are located on suitably constructed towers and furnish local newspapers as well as the central weather bureau with reliable information. They form links in the continental system of weather bureaus, and all the records established are tabulated.

#### EFFECTS OF HIGH ALTITUDES ON HUMAN BEINGS

The increasing migrations to high altitudes of men who have been accustomed to the conditions of the lower altitudes, has led to some interesting studies on the effects of the changed conditions. At an elevation of 14,000 feet, such as is found in the Andes of Peru, the oxygen tension is very much lower than at sea level. The first effect of this changed condition

on a person moving to this altitude, is the imperfect aeration of the arterial blood, causing quick fatigue and dizziness. It has been found, however, that once a person becomes acclimated he can perform a fair amount of mental work for long periods, but this does not hold true as regards sustained muscular effort. On the other hand, natives of these high altitudes can perform remarkable feats of work if allowed frequent periods of rest to make up the deficit of oxygen.

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Tone Amplifier in an Upright Piano: Parts of the Plate and Soundboard are Cut Away to Shop the Air Channels

#### UPRIGHT PIANOS FUR-NISHED WITH TONE AMPLIFIERS

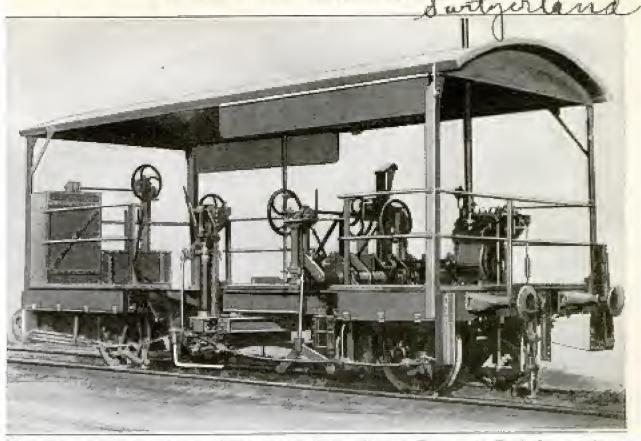
Upright pianos are now being fitted with tone amplifiers that act somewhat in the same manner as the horn of a phonograph, 3 A series of air channels extending 🖠 through the various parts of the wooden frame of the piano, be-& hind the soundboard, are so connected that they act like a single horn, having a length of some 50. or 60 feet. The effect of this method of amplification is said to) improve the tone and increase its sustaining qualities 50 to 100 per The construction can be used with good effect on playe pianos as well.

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Machine for Uprooting Weeds on Railway Roadbeds: The Motor in Front of the Truck Operates Cutters beneath It, for Uprooting the Weeds in the Ballast between the Rails, as Well as Other Cutters outside the Rails. Brushes at the Rear Level the Ballast and Clean the Ties

## WEED-UPROOTING MACHINE OPERATES ON RAILROADS

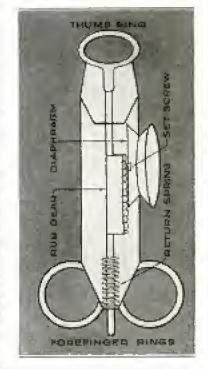
A machine for uprooting weeds or any vegetation from railway roadbeds is in operation in Switzerland, and is giving satisfactory results. The weeding devices are all attached to the frame of a truck that is mounted on railroad-car wheels. On the front part of the truck, under its frame, are a series of cutters, parallel with the railroad ties, which are operated by a motor. As the machine is pushed along by a locomotive at a speed of about four miles an hour, these cutters are driven into the ballast between the ties. At each tie the cutters are automatically lifted. and pass the tie without touching it. Similar cutters on another part of the truck are so constructed that they operate on the ballast outside the rails. At the rear of the machine are rotating brushes which level the ballast and clean the ties. The machine can be adapted to suit any gauge or roadbed.

■Popular Mechanics Magazine does not publish the name of maker or seller of any device described in its pages, but this information is kept on file and will be furnished free by addressing our Bureau of Information.

# HAND-OPERATED HORN USED

Mailmen and traffic officers now have available a hand-operated horn which has

been designed by a New Jersey man to take the place of the familiar whistle. Direct con-tact of the lips with dust and germs accumulated on the whistle, to say nothing of chapped lips in winter, may be avoided by the use of this small horn, which is sounded by pressure of the thumb and two fingers. Being



small, the instrument permits the freedom of both hands while using it.

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#### SOME NOVEL AND LITTLE-KNOWN ACCESSORIES



#### INTENDED FOR THE HOME AND ITS MEMBERS



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dur. Flacher Genry Eummelen, 926 HOLDERS SUPPLY CLEAN FOOD POPULAR MECHANICS

AND WATER TO PET HIRD

If the family is to be away from home for a day or two, the pet bird will not

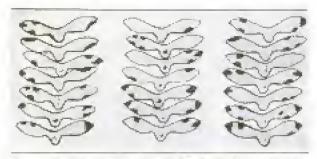


The Containers, Clamped to the Sides of the Cage, Hold Sufficient Pood and Water for Nine Days and Supply These to the Bird as Needed

have to depend on the good memory of neighbors for his supply of fresh food and water, for a container has been devised which stores and distributes a supply sufficient for nine days. The containers are shaped like electric-light globes and connect with troughs extending into the cage. These troughs are narrow enough so that they cannot be fouled by the bird, and the seed trough is supplied with bars to prevent wasting of the food.

#### BRAND REINDEER BY CUTTING 9555 NOTCHES IN THE EARS

When the native reindeer herder of Alaska wishes to brand the animals of his herd, he does not employ the branding iron with which we are all familiar. In-



Ears of Reindeer: The Black Marks Indicate Notches Cut in the Ears as a Means of Branding the Asimals

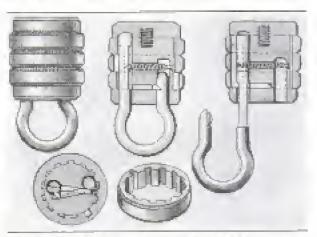
stead, he cuts notches in the cars of the reindeer, the size, location, and arrangement of the cuts serving as a means of identification. By running his hand along the ears of an animal the herder easily determines to which herd it belongs,

## CEMENT SUCCESSFULLY USED AS A FIRE EXTINGUISHER

Recently a fire that had obtained a sign strong hold on some timber sheds and piles of lumber was prevented from spreading and was finally extinguished by means of cement. Piles adjacent to the fire were made fireproof by first coating them with dry cement, and then throwing water over them. Cement was also thrown over the timber that was ablaze, thereby preventing sparks from fly-ing. Another use of cement as a fire extinguisher was in connection with a tank 14 of 400 gallons of oil that was ablaze in the basement of a building, where sacks of dry cement thrown into the burning oil aided in reducing the damage.

#### 9333 PADLOCK-OF SAFE TYPE HAS NUMBERED COMBINATIONS

A padlock, recently patented, operates by any given combination of numbers in the same way as a safe lock. It consists



This Padlock Consists of Five Movable Metal Disks with Numbers on Their Outer Faces, and Operates like a Combination Safe Lock

of five superimposed disks wide enough to allow the inscription on their outside faces of a series of numbers and graduations. The top and bottom disks are somewhat smaller than the other three, which are in the nature of tumblers that can be rotated to bring any given series of num-bers into line. With the required combination, a series of grooves are set in line so that a pull on the shackle of the

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lock releases its latch, and allows the shackle to be withdrawn and turned in any direction.

#### EXPECTED TARIFF REVISION REVERSES RAG TRADE

Recent consular reports indicate that the United States has become a heavy importer of woolen rags from England, whereas ordinarily the trade in this commodity has been in the opposite direction. At the present time, rags are ad-mitted to this country free of duty, but it is expected that a duty will be estab-lished by the new tariff bill, and manufacturers of shoddy cloth appear to be accumulating a stock of woolen rags before the time this action is taken.

## FLUTED EXPANSION REAMER HAS AN ALINING PILOT

recent addition to metal-cutting tools is a spirally fluted expansion reamer, 4164 with alining pilot, that is particularly adapted to the reaming of piston-pin bushings. The flutes are milled to a true spiral angle and give a smooth accurate hole without chattering. alining pilot is slightly smaller than the size of the reamer, and is long enough



Spiral-Fluted Expansion Reamer, with an Alim Pilot, for Use in Resiming Piston-Pin Bushings an Alining

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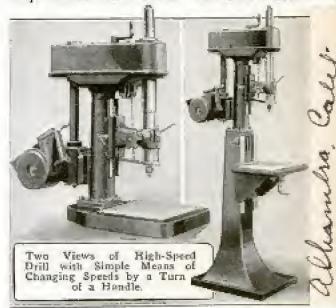
to bear in both bushings in the piston before the cutting begins, thus securing accurate aliuement. At the front end of the pilot is a fluted cutter, to remove excess material in cases where the hole in the bushing is too small to allow the gilat to enter.

#### NEW SPEED-CHANGING DEVICE ON HIGH-SPEED DRILLS

Drilling machines built in two types, bench and pedestal, and in combinations of from one to eight spindles, having three speeds of 5,700, 8,000, and 12,000 revolutions per minute, are now on the market. The outstanding feature of the machine is the speed-changing system. A turn of a handle automatically relieves the belt tension, shifts the belt first from the larger to the next smaller step on one cone pulley, and then by a similar move-Fordick mo

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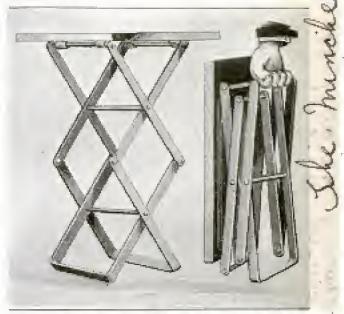
ment from the smaller to the next larger step on the other cone. The belt tension



is then automatically adjusted to the new position.

#### LIGHT, COLLAPSIBLE STOOL FOR CARS OR OUTINGS

That extra seat in the automobile, or relief from the back-tiring effect of sitting on the ground during an outing trip, make be obtained by the use of a light, collapsible stool. The seat when collapsed is 131/2 inches in length, 7 inches in width, 234 inches in thickness, and though weighing only 3½ pounds, is claimed to be strong enough to sustain a weight of 300 pounds.

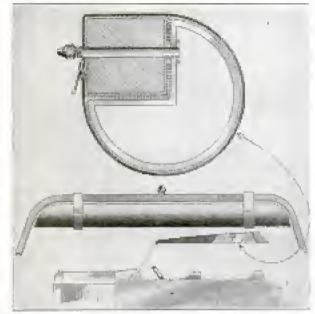


Light, Collapsible Stool, Extended, and Folded for Carrying: It may be Used in the Motor Car, at Picuica, or in the Camp

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PQPUNAR IEAD PROTECTOR FOR USE ON AUTOMOBILE TOPS

In driving over a rough road in an automobile with the top up, the rebound of the springs is sometimes sufficient to

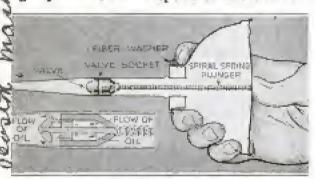


Inflated Rubber Tube Strapped to the Top Bow of an Automobile, to Act as a Head Protector: Above Are Two Detailed Views of the Device

bump the head of an occupant of the car against the hard top bow with force enough to cause severe injury. To guard against this danger, a new invention provides an inflated rubber tube that is strapped to the bow clear across the top of the ear, and forms a cushion that will break the force of the severest blow.

#### 930 8 OILCAN THAT IS LEAK-PROOF FOR USE OF MOTORISTS

To avoid the annoying consequences of an upset oilcan, particularly in an automobile tool box, an oilean has been devised that makes leakage impossible even if the can is reposing upside down. Fitted tightly in the brass spout of the can is a



Leak-Proof Oilean: Notations Explain Its Construc-tion, and the Enlarged View Shows How the Oil Flows When the Valve is Opened

minnealiot socket, with a valve which opens in the direction of the outlet of the spout and is normally held closed and oil-tight by a spring coiled on the valve stem. This extends to the bottom of the can, so that a little pressure opens the valve and allows the oil to flow down the spout,

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#### RUM RUNNERS USE ARMORED AUTOMOBILE

rum\_runner's armored car was wrecked recently near Canby, Minn., and one of the occupants of the car was This machine had three gasoline killed. tanks, which were connected separately with the carburetor, to guard against possible piercing of one of the tanks. Each tank was well protected with sheet-Also there were special iron armor. hoods of sheet iron that were made to fit under the fenders, and could be dropped over the rear wheels by means of a lever, to protect the tires. The car carried a high-powered rifle and an automatic revolver. When captured, 280 quarts of whisky were found in the machine. The driver said he was paid \$150 a month to run between Winnipeg, Can., and Omaha.

## HOMEMADE STENCILS USED .. Q45 IN SELF-INKING STAMP

Stencils made at home can be used in a new self-inking stamp which resembles

the ordinary hand rubber article, but instead of the usual wooden base a reservoir holding sufficient ink to print 1,500 copies is incorporated in it. The appli-



ance was designed to afford an inexpensive means of obtaining a small stamp for return envelopes, letterheads, statements,... shipping tags, labels of all kinds, short announcements, and similar articles.

To protect their messengers by making them as conspicuous as possible, is the scheme to be tried by New York brokerage firms. The messengers will wear bright-red coats and carry five-pound portable saies which will be chained around the waist, the chain being padlocked inside the safe.

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STEEL GOLF CLUBS ALLOWED

BY WESTERN ASSOCIATION

In the matter of steel-shafted golf clubs the United States Golf Association's disallowance of their use is meeting the same fate that was accorded the action of the association in barring Francis Onimet from amateur competitions on the ground that he was engaged in the sale of golf supplies. Both rulings were ignored by the western association, and, in the former case, the famous Bostonian was allowed to compete for, and actually won, the western-championship title. while, in the latter, it has been declared that steel-shafted clubs may be used in the tournaments of the western association. It is thought that on more mature consideration the U. S. association will reverse its ruling, and allow the use of steel clubs in this year's national-championship tournaments.

ALL-STEEL RADIATOR COVERS TO MATCH FURNITURE

To convert the ordinary steam radiator into a window seat, cozy corner, or bookrack, an all-steel cover has been designed that is not only useful, but ornamental as well. It is substantially built, and there are no rough edges to catch and tear draperies or clothing. The cover can be tinted and grained to match the furniture or woodwork in a room. The efficiency of the radiator is not impaired,



This All-Steel Radiator Cover is Tinted and Grained to Match the Furniture or Woodwork in a Room

as a deflecting plate in the top of the cover directs the heated air to a series of large openings in the front.

## OLD-TIME CANNON NOW USED

Built originally as a cannon for throwing a lead shell containing a charge of gun cotton, but abandoned after one trial, a queer old piece of ordnance was considered junk until some one proposed using it as a fog signal. The barrel of the gun is about 2 feet in diameter and the metal is 1 inch thick. For its present use, on a pier at the Naval Proving Ground, Indian Head, Md., it is supported

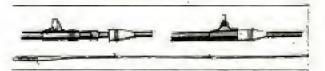


This Old Connon is Now Used as a Fog Signal, and When Struck with a Sledge, Gives Out a Deep Resonant Tone, Audible at Great Distance

by its trunnions between two upright posts, and when struck with a sledge, gives out a deep resonant tone that can be heard a long distance. The sledge is kept hanging on one of the posts so that it is always at hand when needed.

# NO SLIDING OR SIDESWAY WITH NEW FISHING ROD

A thorn in the side of the fisherman who depends upon casting for his amusement has been removed by the invention of a rod which eliminates sliding or sidesway at the pole joints. Because of this common annoyance the guides of the average rod are seldom in alinement. In the new pole, which is made of steel, the female joint is threaded at the lower end and the male joint has a loose ferrule,



Above: Detail of the Improved Fishing-Rod Joint. Open and Closed; Below: The Complete Rod

which is screwed down onto the threads after the joints have been fitted together, making them absolutely immovable.

Holland Rod hyly Co.

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#### CHILDREN'S PICTURE-STORY DEPARTMENT







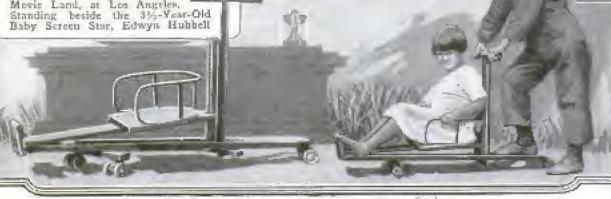
Above: Coke, Six Feet in Districter, Six Feet High, and Weighing 1,200 Pounds, Made by the Baking Department of the Lanc Technical School, Chicago, and Mountul upon a Floot Made by the Students, Which in a Recent Boys' Parade in That City Won the Silver Loving Cup

Below: Two Views of Patent Scooter, ing the Spring Passenger Seat Unoccu Other with a Kildie in the Seat and a at the Rear Doing the Propelling and Steering. Wheels

Major Mire, 18 Years Old, 28 Inches Tall, Weighing Only 18 Founds, Champion Dwarf of the World, Shown after His Arrival in Mexic Land, at Les Angeles, Standing beside the 3%-Year-Old Baby Screen Star, Edwyn Hubbell



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## OF MODERN ACTIVITIES AND INTERESTS



The cl Christraled London el w. Ed J. MECHANICS STEAM SUPPLY IN RADIATO

4312 CONTROLLED AS DESIRED

For regulating the heat of a steam radiator, so that it may be made suitable

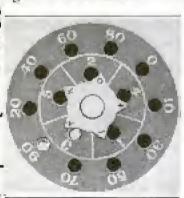


to varying weather conditions, a onepipe installation connects to a supply valve at the top and to an automatic return valve at the base, on the same end of the radiator. At the supply valve is a lever handle by which the supply o E steam can be controlled as desired. Any condensation flows out of the radiator through the

automatic return valve, and goes back to the boiler.

CHILDREN LEARN ARITHMETIC FROM SPINNING TOP

Children may be taught the different signs of arithmetic through the medium



of a spinning top having on its surface two series of figures in circles above small holes. Inside the top, two small steel balls are rotated under the numbered holes, coming to rest, as the

Ftop stops, directly beneath certain of the openings. By means of an indicator which moves freely on the spinning bandle, the indicated figures are then either added, subtracted, multiplied, or divided, as the case may be.

¶Our Burcau of Information is for your benefit. Use it as often as you please.

## NEW CAPTIVATING METHOD 5 OF CHILD PORTRAITURE

A very charming method of child portraiture has lately come into vogue in The sitters are depicted in England. fancy costumes, actively occupied in some childish way, such as playing with toys, or petting "bunnies," all most de-lightfully colored. Several examples of these portraits, with fanciful settings. have been on exhibition in London galleries, and have been much admired.

## ODDITY OF NAME MADE BASIS OF ADVERTISING SLOGAN

Profiting by the oddity of a name, an advertising club in the northwestern part



of this coun-1 F V has adopted the following slo-"Wallas gan : Walla, the Yalley They Liked So Well They Named It' Twice." This ' slogan will be placed on all products.

from that section, on the windshields of . all the motor cars in the locality, and on road-marking signs, and local business men will use it on their letterheads.

## ANY TALKING MACHINE USED AS RADIO LOUD SPEAKER

Any talking machine can be utilized as a radio loud speaker by the addition of an

easily adjusted attachment, intro-duced by an eastern concern. The innovation has three ends, or connections. one of which is attached to the arm of the machine



after the sound box has been removed. To the other two ends, the receivers are affixed, the sound coming out of the instrument in the usual manner, thus making use of the tone amplifier to secure a mellow and plear tone.

10 3 Parkaterenal



## Refacing Old Pulleys and Flywheels

By J. S. HAGANS

WOODEN pulleys sometimes warp so that they do not run true, which causes the belts to flap, and causes a great deal of strain and vibration on the shaft. Aside from the mechanical disadvantages, such a pulley is unsightly. This condition, in the case of wooden pulleys,

is usually caused by dampness and heat. Occasionally, also, a slipping pulley that has been tightened up a number of times will not run true. Pulleys in this condition can be trued without removing them from the shaft, by using the device illustrated in Figs. 1 and 2 of the drawing. toolrest part of the fixture is made from a piece of flat iron, bent into the form of a "U," and drilled with a number of holes for attaching the supporting legs. In use, the device is clamped to the sides of a ladder, with the legs or brackets resting on one of the rounds. After the ladder has been placed in position firmly, the fixture is adjusted so that the front edge is close to the rim of the pulley and serves as a rest for the wood chisel, or turning tool, used to true up the wheel,

A similar dodge is used by shopmen engaged in the rebuilding and overhauling of old machin-

ery, for refinishing the faces of flywheels and steel pulleys, to remove nicks and make them like new. Even were it possible to remove the wheels and do the work on a boring or turning mill, this would increase the labor cost, which, on this class of work, must be kept at the lowest possible figure. If the work is done in a small shop where power is available, set up the engine near a lineshaft. Place a suitable pulley on the shaft to revolve the flywheel at a rate of about 30 ft. per minute; this will turn the wheel quite slowly, but the slow speed is desirable. A

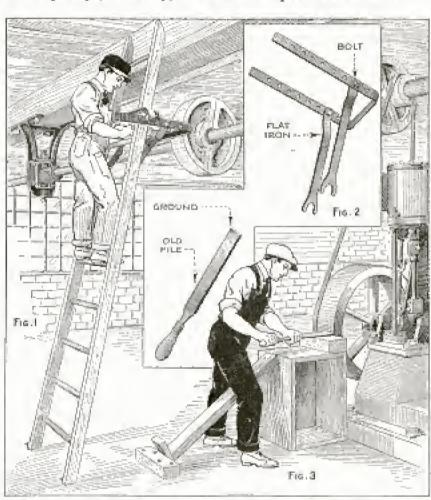


Fig. 1 Illustrates the Fixture Used to Turn Down Wooden Pulleys That have Warped. Fig. 3 Shows How the Faces of Steel Flywheels and Pulleys are Finished to Look like New

box is nailed to the floor near the rim of the wheel, and well braced, as in Fig. 3; this arrangement provides a rest for the tool. A narrow belt is then run on one side of the pulley, and wood strips are used to hold the belt near the edge.

Old files make good facing tools for

such work, and are ground as in the drawing, with a square end. By using such a file as a cutting tool and holding it so as to produce a minimum of clearance underneath, like a scraper, a cut can be taken across the face of the wheel that will remove all the surface nicks, paint, and rust, and give a bright new surface. When one side of the wheel has been finished, the

positions of the belt and box are reversed, and the operation repeated on the other half.

For finishing, the workman can use a regular mill file, or if an extremely high finish is desired, it can be obtained by using emery cloth tacked to a block of wood and pressed against the revolving wheel; a little oil should be used with the emery.

#### Hay Hook Used to Pull Staples

A rancher, finding it necessary to remove about four miles of old fence, tried several methods of pulling the old staples



Using a Hay Hook to Pull the Staples from Wire Fence Greatly Reduced the Labor Involved

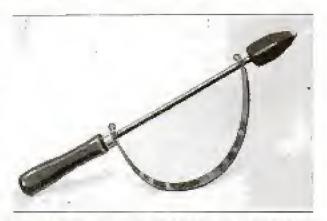
without breaking the wire. It was found that a hammer or fencing pliers would not take hold of the staples, as they were deeply imbedded in the wood. As the wire had to be used again in a new fence, it was desirable that there be as few splices as possible. After trying several schemes, the idea of using an ordinary hay hook was hit upon. It was found that the point of the hook could be driven into the wood under the staple, the curve of the tool providing just the proper leverage. Using this tool as illustrated, no time was lost, no more wires were broken, and it was found that the staples could be pulled almost as fast as they could be driven.-W. W. Parker, Firestone, Colo.

#### Cleaning Platinum Filings

. To remove dirt from platinum filings, spread them thinly in an iron pan, and heat to burn out the dust and other inflammable matter that may be present. After cooling, pass a magnet through the filings a number of times to gather up any fragments of steel and iron that are mixed with them. At this stage the filings can be washed before melting them into a button. As some of the metal may be lost in the melting process, it is suggested that the particles be reduced to a button of pure metal with an oxyhydrogen blowpipe.

#### A Rest for the Soldering Iron

Soldering irons, which are necessarily heavy, have a tiring effect on the user's arm when the job takes any great length of time; especially is this so when the work requires frequent turning, so that the tool must be lifted away from the seam repeatedly. The soldering-iron attachment shown in the illustration has a double use, as it forms a convenient means of holding the iron while it is being heated in the flame of a blowtorch, as well as a rest when in use. The device can be made in a few minutes by bending a piece of flat steel, about ¾ in. wide, into a semicircle and sawing out a slot in each end to clear the shank of the

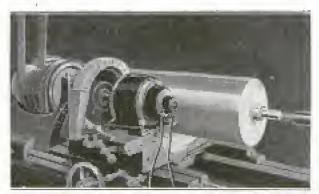


This Attachment for the Soldering Iron Removes the Weight of the Tool from the User's Wrist and Serves to Support the Iron in the Flame

tool. The sides or ends of the slots are doubled over to take pins or screws, which hold the attachment to the iron, leaving the latter free to turn if desired. With this attachment, the full weight of the tool is removed from the arm of the user, the iron being raised or applied to the work by rocking the rest as required. As the rest is intended for repetition work only, it can be slipped on or off in a few seconds. Blocks of wood are used to raise the iron to a height most convenient for the work in hand.—Harry Moore, Montreal, Can.

#### Guard for Lathe Grinder

The illustration shows a simple sheetmetal guard, applied to a grinder used on the lathe. This is an attachment that is usually overlooked when grinding in the lathe, but it is a very necessary one, as it not only prevents injury to the operator's eyes, but keeps particles of the abrasive from lodging in the ways of the lathe. The grinder is simply a small bench



A Simple Sheet-Metal Guard Used When Grinding in the Lathe: A Clamp Holds It in Place, Making It Instantly Detachable

grinder, bolted to the cross slide, and the guard is attached to the cross slide by a clamp.

#### Steel Truck for Enameled Flywheels

The problem of handling 80-lb, castiron flywheels, after they have been enameled, and placing them in a drying oven, without touching the enameled surface, was solved by a large manufacturer by using the steel truck shown in the The flywheels are given a illustration. coat of black enamel, which is sprayed on in a spray booth, and must be carried from it to a baking oven, where they are baked for two hours at a temperature of about 250° F. The special truck designed to handle these flywheels is made from steel angles and will hold 30 wheels at one time, making a total load of about 2,400 lb. Owing to the weight of each flywheel, it is necessary to handle them one at a time from the spraying booth, so uprights

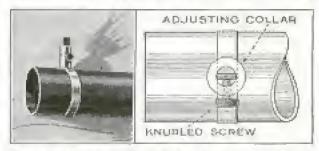


A Steel Truck Used in a Large Manufacturing Plant to Carry Enameled Flywheels from Paint-Spraying Booths to the Baking Oven

are placed in the framework of the trucks at the proper distance apart, and high riveted on to hold six rows of flywheels. Short lengths of 1-in, iron pipe are put through the shaft holes of the wheels before spraying, and the wheels are placed on the truck with the ends of the pipes resting on the lugs attached to the uprights. When the truck is full, it is pushed on its own casters to the baking oven. The casters have wheels about 6 in, in diameter.—Ed. H. Tingley, Dayton, Ohio,

#### Gauge for Marking Tubes

To facilitate the drilling of a circle of holes in tubing or cylindrical work, the marking gauge shown in the illustration will be found useful. Generally, if a shalt has to be drilled with any number of holes around the circumference, it is first "nicked" with a tool while it is running



A Simple Gauge for Scribing a Line around Tubing or Other Cylindrical Work: The Device Consists of a Strip of Spring Steel and a Clamping Collar

between centers, but this method is not always possible in the case of tubing, as

it may not run true enough.

To make this gauge, a piece of flat, flexible steel, long enough to fit around the various sizes of tube, is required. A long collar, of small diameter, is tapped in the side for a knurled tightening screw, and drilled in the center to take the double

thickness of spring steel snugly.

In using the gauge, it is slipped over the work, the two ends of the steel band are pulled through the collar and the screw tightened. A scriber is then run around the work, the point bearing against the edge of the gauge, and if the gauge is properly made, this line will be exactly true and at right angles to the bore. It is apparent that the same gauge can be used for shafts as well as tubes, as, in many cases, the appearance of the former is spoiled by a mark such as made by a lathe tool.

#### Boring Our Pipe-Center Base in Lead Chuck

A pipe center that required boring out to take a new thrust bearing offered a rather difficult problem, as its shape made it hard to hold it true for machining in the lathe. To accomplish this, a lead

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chuck was made, the center clamped in it, and the whole bolted to the faceplate. roughly octagonal mold was built of wood, a little larger inside than the outer diameter of the This center. was placed on a flat, level board, the

center placed within it, base down, and two bolts were driven into holes bored in the board to receive them. The top of the mold was finished level, so that when filled with lead both faces of the chuck would be approximately parallel and square with the center. A smooth board, with a hole for pouring and a small vent hole, was clamped over the top of the mold, with the point of the pipe center and the two bolts projecting, and the mold poured full of lead.

When cool, the mold was removed, the

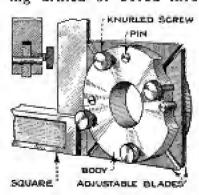
pipe center driven out, and the chuck bolted to the faceplate and trued up as nearly as possible. Then a light cut was taken along the side of the cavity, using the compound rest, at the same angle as the face of the pipe center, until the center, when placed therein, was found to run true. It was then clamped in place by a couple of short straps, and the boring continued, taking light cuts so as not to throw the chuck out of true. The point of the center projected through the chuck and into the center hole of the faceplate.

#### Driving Nails to Prevent Splitting

French cabinetmakers have a simple method of preventing large or small nails, when driven close to the edge, from splitting the wood. The nails have their points blunted by tapping the ends lightly with a hammer while resting the heads on a piece of iron. Treated in this manner, the nail, when driven, pushes the wood fiber before it, preventing splitting, whereas the sharp-pointed nail pushes the fibers of the wood to the sides, causing a tendency to split.—Edson E. Shatto, Serena, Ill.

#### A Precision Testing Block

Many shops often feel the need of having something absolutely square for testing purposes, yet very few have facilities for machining a piece so accurately. The drawing shows a testing block that is made up of several parts, and is so constructed that it can be made in any shop, however meager the equipment. The round body is made of machine steel, a hole being drilled or bored through the center



for convenience in handling, and a groove cut around the eircumference. to take the adjustfour able blades. The latter, which should made be tool steel.

need not be accurate except on the outside edge, which should be perfectly flat. They are attached to the body, at right angles to each other, by snug-fitting pins through their centers, which allow them to rock against the bottom of the groove.

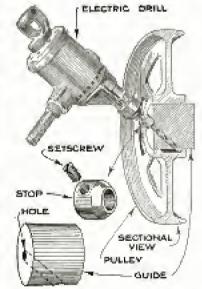
Each blade is tightened separately by a knurled screw, threaded into the body a little to one side of the pins. To set the block square, place the tool on the surface plate and bring an adjustable-blade square, bevel gauge, or similar device that is capable of being adjusted out of square, against one blade. With both pieces set approximately square, set the four blades alternately, adjusting them and the square or bevel until the block can be turned to all four positions, and the contact between blades and square is lighttight; then tighten all the screws. It will be seen that both the block and the other testing piece must be absolutely square when this result is reached, and that the fixture can be used to prove the squareness of any work, with confidence as to ассигасу,

#### Cutting Oil Grooves in Pulleys

The drilling of an oil groove in the bearing of a loose pulley, or similar part,

is a simple operation when a loose-fitted drill guide, of the type illustrated, is used.

The guide consists of a piece of round bar stock, of approximately the same diameter as the hole in the pulley, with a diagonal hole extending from the center through the side. A stop, to be



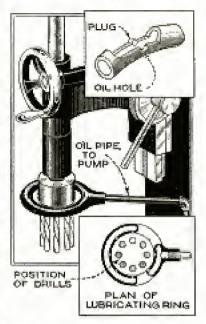
clamped to the drill, has one edge beveled off to correspond with the angle of the hole in the guide, against which it bears. As the drill is fed forward, the bearing metal is cut away to form a V-bottomed groove. As the guide is free to move in any but a perpendicular direction, variations of the operation described make it possible to cut grooves in a variety of patterns.

¶To clean scale from gray-iron castings, pickle by immersing in water containing not more than one per cent of sulphuric acid and let stand for two or three hours; rinse in cold water, and scour with sharp sand and a fiber brush.

#### Supplying Lubricant to Drilling Head

To supply lubricating and cooling compound to the eight spindles of a drill head, the arrangement illustrated was success-

fully used. A hollow casting served as the lubricating ring. The holes through which the lubricant flowed were drilled. entirely through the walls of the casting, the superfluous orifices in the outside diameter being closed with plugs. The completed lubricating ring was placed

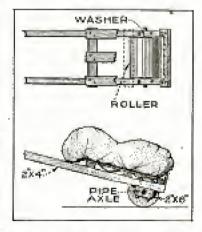


around the drilling head, and connected to the oil pump on the machine with pipe. In use, the lubricant is pumped through the holes and runs down the drills.

#### Roller Truck for Farm or Factory Yard

A truck, built after the style of a baggage truck, but with a long roller instead

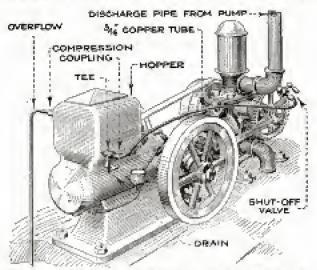
of wheels, is handy about thefarmor factory yard for transporting tools, sacks of grain, and other heavy and bulky loads, the roller permitting use of the device on soft ground. The construction is simple



and may be modified to suit the particular use to which the truck is applied. The roller can be made from a piece of large-diameter pipe, provided with wooden ends, which are drilled to accommodate the pipe axle. For a more elaborate truck, a cold-rolled steel axle, running in east-iron bearings, can be used to make the truck run easier. Washers should be placed on the shaft between the ends of the roller and the bearing blocks.

#### Cooling System for Hopper-Type Pumping Engine

A 1½-hp, gasoline engine with a hopper-cooled cylinder was used to operate a well pump that elevated water to a tank.



By Connecting a Hopper-Cooled Gasoline Engine to the Discharge Pipe of the Pump, It Operates by a Small Pipe Line. It Is Almost Impossible for the Hopper to Boil Dry

The hopper required periodical filling, and it was feared that this might sometimes be overlooked, so that dangerous overheating might develop. Accordingly, a continuous-flow system was installed by bringing a Me-in, copper pipe from the discharge pipe of the pump to the lower end of the water hopper. A shut-off valve was provided in the line, to cut off the supply of water or regulate its flow. A drain cock was also fitted, close to the hopper. Near the top of the hopper, a hole was drilled and tapped; a compression coupling was screwed into this hole, and another copper tube carried off the overflow. Of course, any other size of pipe and type of couplings can be used, but Mo-in, pipe and fittings will generally suffice, as only enough make-up water is required to keep the hopper filled, the temperature of the water usually being kept close to the boiling point.

#### Annunciators for Group Machine Operators

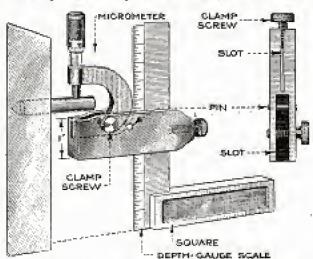
Where a single operator is responsible for the output of a group of machines, such as screw machines, gear cutters, millers, and the like, an ordinary electricannunciator and bell system can be used to call to the immediate notice of the workman the machine that requires attention, as when it runs out of stock.

Electrical contacts are arranged on the machines thus equipped, in such a man-

ner that, on the completion of a particular operation, the needle on the annunciator will point to the number of the machine to which it is wired. The contacts, in most cases, can be attached to the bed and table, to automatic stops, or to other parts of the machine. One of the contacts must be insulated from the machine by mounting it on a fiber block.

#### Micrometer Height Gauge

The height gauge, although a very useful tool, is beyond the reach of many mechanics by reason of its cost. However, a very serviceable instrument can be easily made from the tools found in most kits—a micrometer, square, and depth-gauge scale, held together by the attachment shown in the drawing. The clamping device for holding the micrometer to the perpendicular scale is made from a piece of 1/2-in. flat steel, slotted at the top for the micrometer frame, and at the rear for the square blade and The slot at the rear is the same width throughout, as the blade of the square and scale will be alike, or nearly so, in thickness. Before this slot is cut, however, the attachment is tapped for the screw which holds the square and scale parts together. The micrometer is held to the attachment by a clamping screw which binds the instrument tightly. When the micrometer has been lined up squarely, a small hole is drilled and a pin inserted; thus, when the tool is to be assembled, it is only necessary to slide the micrometer



A Substitute for the High-Priced Micrometer Depth Gauge: The Mechanic can Make It Himself from the Tools That Already Form a Part of His Kit

along the slot until the frame touches the pin, when the screw is tightened.

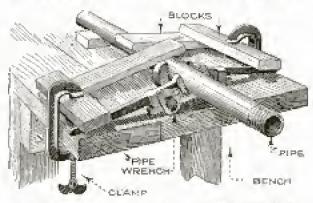
The distance from the top of the micrometer anvil to the bottom of the clamp should be exactly 1 in. Then,

when measuring the height of a plug 4.560 in, from the surface plate, the attachment would be set so that the bottom was exactly on the 3-in, line of the scale; this, plus the 1-in, thickness of the attachment, gives 4 in., the height of the anvil face. The micrometer spindle is now raised .560 in., which is the correct height of the plug. If care is taken in reading the scale, accurate results will be had. However, if 1-in, measuring blocks are at hand, the insertion of three of these would give the highest accuracy much more easily.

#### An Improvised Pipe Vise

When pipe is to be threaded or cut, and there is no pipe vise handy, a pair of pipe wrenches can be rigged up to serve the purpose. The wrenches are applied to the work so that they face in opposite directions, which prevents the pipe from turning either way; both the wrenches and the work are clamped to the bench with blocks.

Pipe to be cut or threaded can be held as securely by this method as in a regu-



Threading and Cutting Pipe in an Improvised Subtitute for a Pipe Vise: Two Pipe Wrenches are Used to Hold the Work, the Whole being Clamped to the Top of the Bench

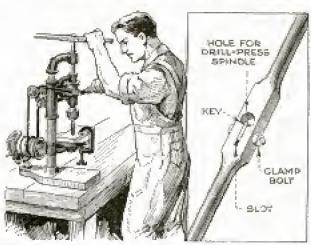
lar pipe vise, if the wrenches are properly secured and adjusted, although, of course, more time is required to clamp and release the work.

#### Hand Tapping on a Sensitive Drill

The drawing shows an arrangement for tapping by hand, with the tap held in the chuck of a sensitive drill, the spindle being turned by a handle attachment clamped to the upper end. This method insures a true start of the tap into the hole, especially if the hole is drilled and tapped at a single setting of the work; there is also less chance of tap breakage. If much repetition work is to be done, it would be well to cross either the main

drive helt or the speed-changing belt on the drill press so that the tap can be backed out by power.

The handle attachment may be either a



Holes can be Drilled and Accurately Tapped at a Single Setting of the Work in a Sensitive Drill. A Handle Attachment Clamped to the Spindle Makes the Tap Enter Accurately

casting or forging, or it may be turned from rectangular stock. A key is provided, which fits into the spindle keyway, and the slot in the handle into which this key fits also serves to secure it tightly to the spindle. In starting the tap into the work, pressure is applied to the feed lever with one hand, while the other hand is used to turn the handle. After the tap is started, the feed handle is allowed to work freely, and both hands are used.

#### A Combined Hammer and Drift

For the particular use of drill-press operators, the combination lead hammer

and drift not only saves the operator's time, but he always has at hand the means of driving a drill firmly into its socket without damage. The taper key or drift is made froflat-steel stock and swhat longer than the key, because it must he handle of the h



BADDITT

is used for driving out the drill.—M. E. Duggan, Kenosha, Wis.



## A CHEAP CONCRETE MIXER

By W. S. BETTS

HE farmer would use much more concrete construction than he does, were it not for the difficulty of mixing any large quantity by hand. A very satisfactory mixer, which should not cost more than \$15, may be made by following these plans; it will mix about two wheel-

barrow loads at a batch,

The mixer proper is a lime-sulphur barrel, tar barrel, or any other heavystave barrel with one good head, that is, a head that is perfectly flat and is firmly attached to the barrel. This barrel rotates around its long axis in a frame that is arranged to tilt within another frame, thus dumping the batch.

The gears, sprockets and chain, shafts, bearings, etc., can be salvaged from a garage junk pile, or purchased from one of the junkmen who make a specialty of wrecking cars. There should be no difficulty in finding the materials, as they

are all common automobile parts.

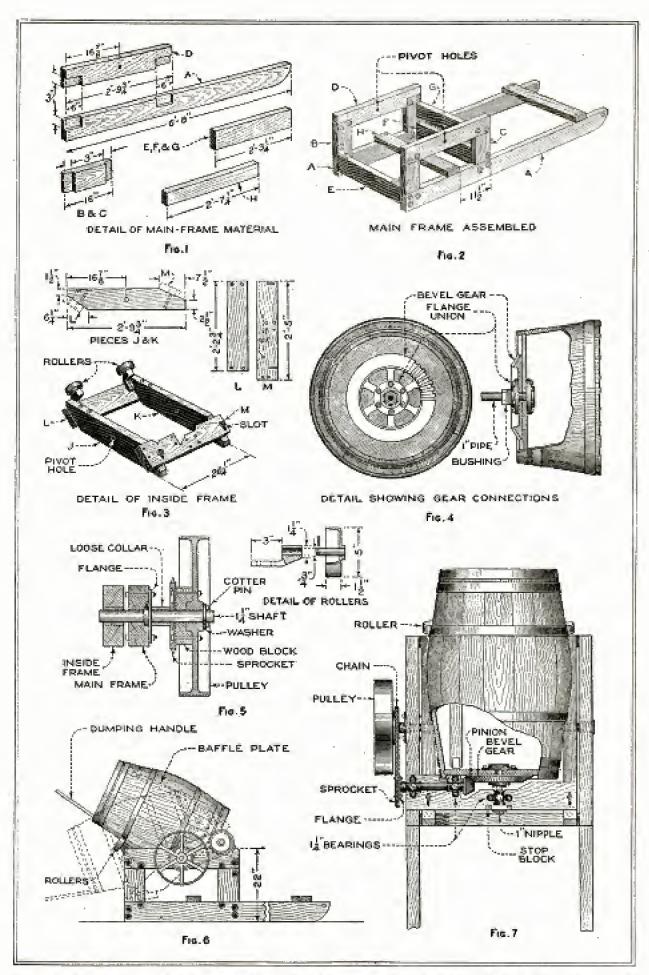
Obtain a bevel gear, about 12 in. in diameter, and its pinion; the pair should have a ratio of about 4 or 5 to 1. This gear will be in the form of a ring bolted to a flange. Remove the flange, and bolt the ring gear to the best head of the barrel, first knocking out the other head. Be very careful to center this gear exactly on the barrel head. From the plumber, get a 3-in, boiler flange union, a 3 to 1-in. bushing to fit the union, and a I-in, long nipple. The flange union is in two identical members, fastened together by bolts. One member should be centered on the head of the barrel and bolted to the other member on the inside of the head, sandwiching the head between the two members, as in Fig. 4. The bushing and nipple may now be screwed in. It is well to smooth the surface of the nipple with a file, or to skim it in a lathe, if one is available, as it is to turn in a bearing,

Three 14-ft. and one 10-ft. 2 by 6-in. timbers will suffice for the entire frame. It is better to get these dressed on all four sides. The dimensions of the mainframe pieces are shown in Fig. 1, and the manner of framing in Fig. 2. The halflap joints should be carefully cut, and the inside of each joint should be painted before bolting together. The crosspicees

E, F, and G, may be fastened by means of heavy lag screws if desired, although the method shown is the better. It will be necessary to strengthen the frame in front by two angle irons, shown in Fig. 2. The inside frame, which tilts within the main frame, is shown in Fig. 3. This is pivoted in the main frame, on the right side, by means of a heavy bolt turning in a piece of pipe, as shown in Fig. 7, but the left side is somewhat different. pivot shaft must extend beyond the main frame, and be held fast, so that the pulley, shown in Fig. 5, may turn upon it. This is best accomplished by means of a flange through which the shaft passes, and by which it is rigidly held, the flange being securely bolted to the outside of the main frame. The hub of a discarded automobile wheel will furnish the flange, and an automobile axle the 11/4-in. shaft, As the inside frame turns upon this shaft, it is well to use a piece of 11/4-in, pipe for a bearing. The inside frame may now be put in place, when it will be found that the projecting end of the board M, Fig. 3, will strike on the back left-hand corner of the outside frame. Cut this corner off so that the inside frame will be nicely

The pulley that takes the belt from the engine should be of such size that the mixer will rotate 40 or 50 times per minute. This is a simple calculation, as the gear ratio at the barrel head is known, and also the speed of the engine, and the size of its pulley. Simply multiply the speed of the engine by the size of the driving pulley, and by the number of teeth in the pinion. Divide this result by the product of the number of teeth in the bevel gear and the number of revolutions the barrel is to make.

For example, supposing that the engine makes 300 r.p.m., the engine pulley is 8 in. in diameter, the bevel gear has 40 teeth, and the pinion 10, and that the speed of the barrel is to be 40 r.p.m.: The speed of the engine, 300, is multiplied by the size of the pulley, 8, and by the number of teeth in the pinion, 10. The result is then divided by the product of the number of teeth in the bevel gear, 40, and the r.p.m. of the barrel, 40; the result is 15. This is



Complete Details for the Building of a Cheap but Strong and Durable Concrete Mixer for the Farm: All the Mechanical Parts may be Obtained from the Automobile Junk Dealer, and the Necessary Lumber will Usually be Found around the Farm

the size of the necessary pulley, in inches. There is no reduction of motion in the sprockets, as they are of equal size. The pulley should be bored to take the 11/4-in, shaft,

From the junkman obtain two sprockets, such as are used for chain-drive trucks, and about 5 ft. of sprocket chain. These sprockets are in the form of rings bolted to flauges. Remove the flange and bolt the ring to the belt pulley, as in Fig. 5. It will be necessary to block the sprocket out from the pulley, so that the chain may clear, and this is best done with a wood block. Bolt the sprocket through the wood to the spokes of the pulley. The pulley and sprocket may now be slipped onto the shaft, where they should turn easily, first inserting a collar of 1½-in, pipe and a washer for the pulley to bear against. Fig. 5 shows the complete details.

The builder is now ready to transfer the motion from the pulley and sprocket to the barrel. The motion is received from the pulley by the second sprocket, which is fastened to a 1¼-in, shaft, at the other end of which is keyed the bevel pinjon. This pinion engages the bevel gear on the head of the barrel. The details are given in Fig. 7. The shaft turns in two 1½-in, bearings, such as are used for automobiles. It will be seen that the board M, Fig. 7, is cut away to clear the barrel chine, gears, etc. No dimensions can be given for this, as the amount cut

will probably differ in every case. The best way to do this is to put the barrel in place with the nipple resting on board M. Block up the front of the barrel 2½ in. from the board L, Fig. 3. Line the shafts up carefully, and cut away board M, so that the bevel gear may engage with its pinion. Bolt the shaft bearings into place, also the bearing for the nipple. A hardwood stop block, bored to accommodate the nipple, should now be bolted to board M, and a washer and pin inserted. This is to prevent the barrel from sliding forward when tipped.

The front end of the barrel is supported and rotates on two rollers, or casters, shown in Fig. 6. If two heavy discarded ball bearings can be obtained with the other parts, they will make splendid rollers, if protected from the cement and dirt; it will probably be necessary, however, to have these rollers cast in the nearest foundry. The cost should not be over \$3 each. The measurements are shown in Fig. 5. These rollers should be bolted to board L, so that the barrel will rotate between them, and so that they will keep the nipple at the head of the barrel central in its bearing.

A dumping handle bolted to the inside frame, and a baffle plate fitted inside the barrel, as indicated in Fig. 6, complete the machine. If the work has been carefully done, the machine should give as good service as commercial types costing five

times as much.

#### Clamp for Squaring Ends of Belts

The successful use of any of the various devices intended for joining the ends of belts requires that the ends be perfectly



If a square. belt is repaired with its ends uneven, the strain will naturally be unequal, which tends to pull the belt more or less out of line and shorten its life, Many belt repairers use an ordinary square to mark off the broken ends and after-

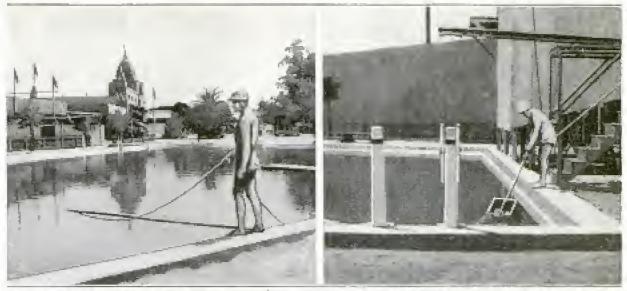
ward cut down to the line, but it is a difficult job to cut straight across a belt,

the knife always showing a decided tend-

ency to run off.

For such work, the spring clip illustrated is well worth making. The material used is heavy, flat spring steel, annealed and formed as shown, after which it is tempered lightly. It is apparent that no matter what thickness of belt is used the inner ends of the clip always lie flat against the sides. When in use, the belt is laid on one edge and the clip sprung over until the ends rest on the bench; the end of the belt is then sliced off, with the knife held against the side of the clip. Little time and no fuss are required to trim the ends of a belt in this way, as the clip can be sprung on or removed almost instantly.

(Milling cutters with helical teeth are better for use on wide surfaces than straight-toothed cutters, as the former shave off the metal at an angle and less power is required; they also leave a more finished surface.



A Simple Method Used by a Swimming Instructor to Keep the Surface of an Open-Air Swimming Pool Free from Dust, Sticks, Paper, and Other Debeis Blown into the Tank: Left, the Device in Use; Right, the Débris is Collected at a Corner of the Tank and Removed with a Fine-Meshed Wire Scoop

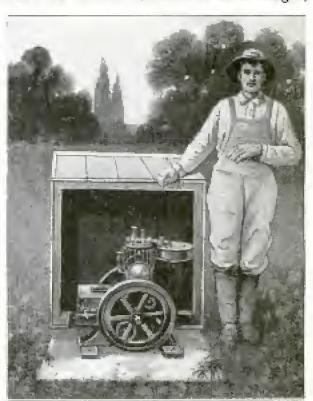
#### Skimming Flotsam from Surface of a Swimming Pool

At a California amusement park, the Hawaiian instructor at the big outdoor swimming tank has a clever system of keeping the surface of the water free of flotsam, such as dust, twigs, paper, and the like, blown into the pool by the wind. He does the work of cleaning the pool in a few minutes from the edge of the pool without the aid of a boat, and leaves the pond as clean as a sheet of polished glass.

He ties a long rope to the ends of a long stick or scantling, so that when he grasps the middle of the rope a triangle is formed. This allows him to keep the wooden base of the triangle constantly on the surface of the water as he draws it along by the apex, the flexibility of the rope allowing the user to keep ahead of the "drag" and remain on the edge of the pool. The stick always floats with most of its surface well above water, and if dragged at an angle to the sides of the tank, with its inside end in contact with the wall, and not too fast, a perfectly clean area is left behind. In this fashion the device is pulled to a corner of the pool, where the débris is easily and completely gathered up with a fine-mesh wire scoop, as shown in the right-hand photograph.-L. R. Perry, Berkeley, Calif.

#### Shelter for Small Engine

Many farmers, or dairymen, have a pump and small engine at some distance from the house, the engine being protected, if at all, only by a tarpaulin, or similar covering, to avoid the expense of a pump or engine house. In such cases, a shelter of the type illustrated can be built at a trifling cost for time and materials, and will afford complete protection. The engine is bolted to a concrete-block base, and the box shelter is fastened to one side of the foundation with hinges,

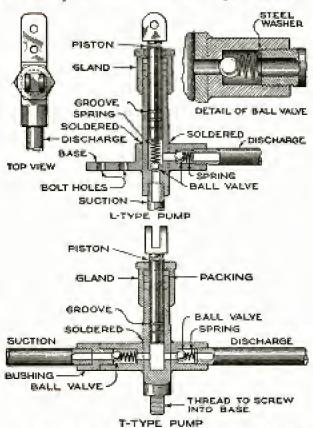


The Life and Usefulness of a Small Form Gas Rogins can be Greatly Increased by Providing Adequate Protection from the Elements

which are held by bolts set in the block. Thus, it is a very simple matter to cover or uncover the engine.—H. J. Engel, New Braunfels, Tex.

#### Small High-Pressure Pumps

The handicap of being unable to obtain small high-pressure liquid pumps often holds up the work of the experimenter;



Two Forms of High-Pressure Pumps That will Meet the Requirements of the Experimental Mechanic: Of the Two Types, the L-Type Is the Simpler to Make

pumps of the styles shown, however, can be made at small expense. In these pumps, steel balls taken from ball bearings are used for the valves; where water is to be the element pumped, the use of brass throughout is recommended. The L-type pump is the simpler to make, as it requires a minimum of time and material. The pump cylinder is made of brass, with a carefully reamed hole for the bore. At the bottom of the bore is the suctionvalve seat, on which the ball is held by a spring attached to the bottom of the piston. The discharge is through the side opening, which is fitted with a ball valve working outward. The cylinder and piece carrying the discharge valve are made separate, then assembled and soldered or brazed together, making a strong, tight joint; the discharge-valve piece is extended, as shown, to form a base for the attachment of the pump to the rest of the machine. The piston should make a snug fit in the cylinder, and should have two or three grooves cut in its lower end; these grooves hold the liquid and help to

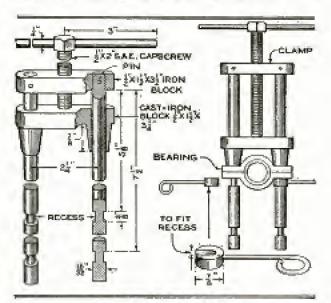
seal the piston. A stuffing box at the upper end carries the packing, which can be adjusted to the proper tightness by

screwing down the gland nut.

In the T-type pump, the suction is opposite the discharge, instead of at right angles to it as in the L-type, and in order to make the machining of the suctionvalve seat an easy matter, it is cut in a bushing screwed into the valve body. The springs should be well fitted, with the end placed against the ball small enough to prevent it from slipping over the ball, and with the base large enough to center it in the cavity. To make a neat job of these spring seats, small steel washers, with holes in their centers, can be used to hold the springs in place. The pistons or plungers may be operated by eccentries, cams, or small crankshafts.

#### Clamp Aids in Fitting Bearings

In all the larger repair or service shops for the most popular make of light antomobiles, the bearings of the engine are "burnt in," or fitted with a machine. As these burning machines are quite expensive, the small shop must still use the time-honored method of hand scraping. After the babbitt in the cylinder block and in the bearing cap has been scraped to an approximate fit, the cap is bolted down and the crankshaft revolved. Often the cap bolts must be loosened and tightened several times before a correct fit is



A Fixture for the Automobile-Repair Shop That Cuts Down the Time of Fitting the Main Engine Bearings of Light Automobiles

obtained or the proper number of shims inserted.

By using the tool shown in the draw-

ing, about two-thirds of the time used in fitting the shims can be saved. The two pieces of steel rod, each 9 in. long, are turned and assembled with the other parts, the form and dimensions of which are shown. Two washers are made from tool steel, slotted to fit neatly into the recesses on the rods, a handle is screwed into each, and the washers are then hardened.

To use, place the bearing cap in position, with the estimated correct number of shims under it, place the cast-iron block upon the cap so that the holes coincide, and slip the rods through the holes. If in the first, or center, bearing, the recess near the upper end will extend beyond the upper end of the hole about 1/8 in. If in the rear bearing, the recess near the middle of the rods will be the one to use. Slip the slotted washers into the recesses in the rods, tighten the cap-screw, and try the shaft. If it needs more or less shims, loosen the setscrew, pull out the slotted washers and lift off the cap. Repeat the operation until the shaft is just right, then insert the proper bolts, tighten the nuts and insert cotter pins.-Vernon Orr, Pomona, Calif.

#### Auxiliary Tip for Micrometer

The drawing shows an attachment for incrometer calipers that will be found



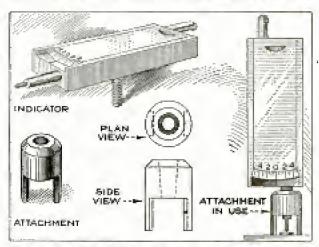
very useful when calipering narrow slots, or places that are not easily measured without their use. Either or both anvil and rod can be fitted with these caps, which are turned, hardened, and ground to the form shown. The inside diameter is a trifle smaller than the diameter of the parts they

fit over, but by slotting them as shown, they make a close fit.

#### Attachment Increases Usefulness of Test Indicator \*

The drawing shows a fast and accurate way to gauge the height of projecting parts with a familiar type of test indicator to which a simple little attachment is applied. The attachment is turned from machine steel, and taper-bored to fit over the stem of the indicator. If the device is to be used for gauging a large number

of parts, it would be advisable to caseharden the points of contact. The indicator is particularly useful for grinding

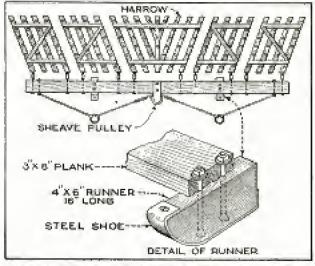


A Simple Attachment, That Slips over the Stem of a Test Indicator of a Pamiliar Type, Makes the Latter a Direct-Reading Height Gauge

operations. The great advantage gained by using this type of gauge is that the indicator shows how much more metal is to be removed.—T. Rod, Montreal, Can.

#### Drawbar for a 24-Foot Harrow

As generally equipped, the drawbars of tractor-drawn harrows have a tendency to pull the forward end of the implement either up or down. If the drawbar is made from a single heavy timber, the harrow can be made to run evenly. It is placed on steel-shod runners, which may be made of wood and shod with pieces of tire iron. The width and depth of the



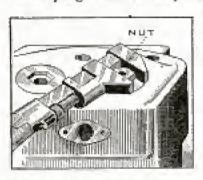
Preventing a Large Power-Drawn Harrow from Fulling Up or Down at the Forward End by Attaching the Harrow to a Single Heavy Timber Mounted on Iron-Shod Runners

runners will vary according to the character of the soil on which the outfit is used and the length of the drawbar. A little

experimenting may be necessary to get the right height, but after this is obtained, no further trouble will be experienced. The harrow is attached to the tractor drawbar by means of the equalizing arrangement shown attached to the forward edge of the beam,—L. A. Krider, Hatton, Wash.

#### Removing Cylinder-Head Plugs

Many types of automobile engines have plugs inserted into the cylinder head so that they can be unscrewed for inspecting, grinding, or removing the valves. Such plugs are usually made to be un-

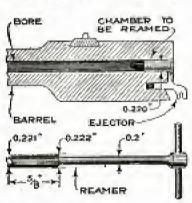


screwe: I with a hexagonal key or wrench, and this is so metimes lost, broken, or otherwise unavailable when most needed. In such an emergency the plug can be

removed or screwed down by a simple method. A hexagonal nut, of a size that will fit into the wrench seat of the plug, is selected and put in place so that about half its thickness projects above the surface, providing a grip for a wrench.—Stephen Gladis, Forestville, Conn.

#### Rechambering a .22-Caliber Rifle

Those who have done considerable target shooting with a .22-caliber rifle have probably been annoyed at some time or



other by the frequent sitcking of the shell after it has been discharged. This occurs only in rifles that have been in long and continued use, and the sticking is due to the wearing of

the cartridge chamber from the lapping action of the copper on the steel barrel. This wears the forward end of the chamber a trifle larger, and as the fired shells expand to a tight fit, they will not eject on account of the taper in the chamber.

The reamer shown in the drawing was

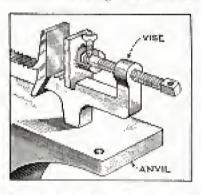
made for rechambering a rifle in which the trouble described had developed. Drill rod was used for the reamer, four flutes were milled out, and the shank turned to the dimensions given in the illustration. The original diameter at the ream of the chamber was .22 in. and the reamer was made .002 in. oversize at the back and .001 in. larger at the front. As the chamber was only \% in, long, the reamer was limited to the same size. In using such a reamer, apply a little lard oil as a lubricant, and turn the tool slowly. The same idea can be applied to rifles of larger caliber when similarly worn,

The ejector is usually blamed when a shell sticks, yet, as often as not, in an old rifle, it is blameless, and the sticking can be traced to the cause assigned.—J. V.

Romig, Allentown, Pa.

#### Vise for the Blacksmith's Anvil

Fitting into the hardy hole of the anvil, a vise such as the one illustrated makes it possible for the smith to do single-handed a variety of work that ordinarily requires the assistance of a helper. The body of the vise is provided with a series of notches along its horizontal extension.



into which the tooth on the back of the rear jaw fits, making the tool quickly adjustable for work of different sizes. The vise screw is grooved on its inner end and is held to the

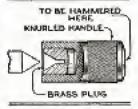
front jaw by means of a screw, the end of which fits in the groove.

#### A Lathe-Center Driver

The drawing shows an easily made convenience for tapping into place the

live and dead centers of a large lathe. A hardwood block is commonly used for the purpose, but this soon splits up.

A heavy body is made up from either machine or tool steel,



knurled if desired, and with one end drilled a drive fit for a brass plug, which is drilled and reamed out to fit the 60° lathe centers. A large, combined center drill and reamer should be used for the purpose; in any event a hole must be drilled beyond the conical bore in order not to injure the point of the lathe center while driving it into the spindle. If the brass plug is set in slightly, as shown, it will help protect the center hole from accidental damage.—H. H. Parker, Oakland, Calif.

#### Chipping Tough Steel

Every mechanic knows the difficulty of cutting or squaring off the ends of keyways in a tough steel shaft. Also,

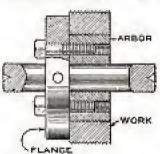
he knows from long experience that the ordinary cape chisel does not hold out long. The idea illustrated by the drawing shows how a short piece of high-speed steel may be used in a holder to make a thoroughly worthwhile chipping chisel.



The holder is made from a piece of coldrolled rod, with a square opening broached in the end, into which the high-speed tool bit is inserted and held by means of a setscrew on the side.-John Aures, Buffalo, New York.

#### A Special Threading Arbor

Cutting an outside thread on work that is already provided with a thread inside, usually results in marring the outer threads when at-



tempting to remove the work from the arbor. With the arbor illustrated, when the capscrews are released, the work may be unscrewed with the fingers.

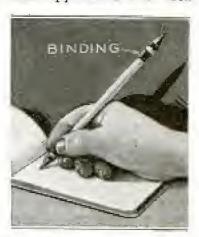
It consists of a flange, pinned to an arbor, and drilled for two or more capscrews. These capscrews hold to the flange a piece threaded to fit the internal screw on the work, bored an casy push fit on the arbor, and drilled and tapped for the screws.

The work is screwed on when the screws are tight; when the thread has been cut, the screws are loosened, and the work, being no longer screwed up tight against the flange, may be easily removed.—Harry Moore, Rosemount, Que.

#### Pencil Holder Made from Paper

Draftsmen, shopmen, and others who have occasion to use pencils for any length of time will appreciate the idea

shown in the engraving, which allows short pencil stubs being used to give the utmost in service. The chief objection to use of pencil stubs is the tight and tiring grip that must be used to hold them



in the fingers. This objection is overcome by rolling a cylinder of stiff paper around the short pencils, one in each end, and binding securely with cotton thread, tape, or an adhesive strip. If the paper is glued along the unbound edge of the cylinder, it will outlast a good many stubs before it must be thrown away.

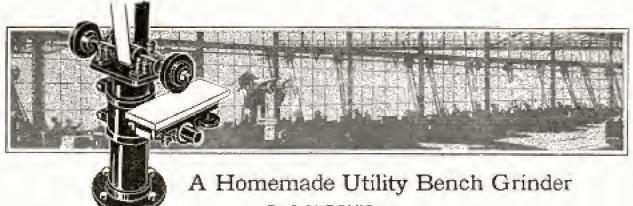
#### Babbitt Ladle Made from Wagon Skein

As the illustration shows, an excellent babbitt ladle for use around the farm or lumber camp can be made from an old

wagon skein and a piece of iron rod, to serve as a handle. The larger end of the skein is cut square across, heated, and a lip or spout formed on the edge for convenience in pouring the metal. The lag-screw hole at the small end is filled up with a short bolt, with the head



inside and the outside end riveted. One end of the rod used for the handle is flattened, bent around the skein, and welded to the opposite side, making a continuous eye, and a small eye is turned in the other end by which the ladle is hung up when not in use.



By J. V. ROMIG

THE grinder illustrated and described in this article is an ideal type of machine for use in the experimental shop, small assembly department, or even the home workshop. The construction is simple, as the parts are easily obtained, and a minimum of machine work is required. Users of a grinder of this type have the benefit of two machines combined in a compact unit without sacrifice

of strength.

The head of the machine requires two 1-in, pillow blocks as bearings for the grinding-wheel arbor; these bearings can be bought for a small sum from any machinery-supply house. The spindle, or arbor, is made of good tough steel, and grooves are turned in the bearing surfaces, as shown in Fig. 3. These grooves take the thrust, and prevent the shaft from moving endwise in its bearings. This feature of construction will, of course, make it necessary to rebabbitt the hoxes, to make the simplest and strongest bearing. The ends of the spindle are threaded with right and left-hand threads, as shown, for the wheel flanges that hold the grinding wheel to the shaft, The driving pulley is fastened to the spindle between the bearings, and oil cups of adequate capacity are fitted to the bearings to insure proper lubrication.

Four-inch pipe is used to make the pedestal of the machine; this pipe is turned down to an outside diameter of 31% in. and threaded at each end for screwing into the flanges. The flange at the bottom end of the pipe should be of the largest diameter obtainable, to make a solid base for the machine. The upper flange is shaped into rectangular form, as a base to which the two pillow blocks are bolted, and it may be necessary to have

this cast.

In order to use the machine as a surface grinder, a special tee, fitted with an arm to carry the table, is added. A 4 by 4 by 2-in, tee serves as the body; it is chucked in the lathe, and the threads bored out to 31%-in, inside diameter,

making it a neat sliding fit on the turned pipe column. Ears, or lugs, are then welded to the rear side, as shown; these are drilled and tapped for the clamping screws, after which the lugs and tee are split, to make a clamp for holding the support at any position on the column. A section of 2-in, pipe is screwed tightly into the side of the tee; this horizontal piece of pipe is turned down to 1½ in, outside diameter. This arm must be perfectly square with the main column, when assembled, as it supports the pillow-block base of the pivoted worktable.

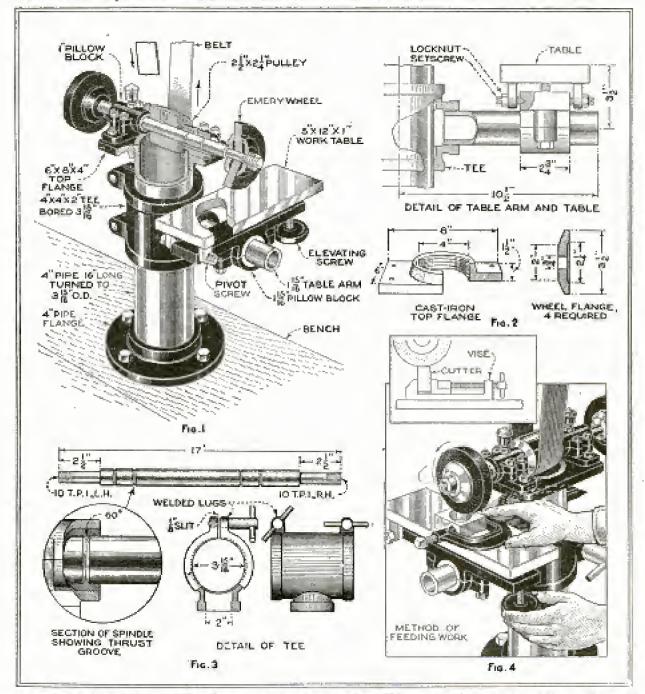
The worktable is made from a slab of flat steel, with pivot lugs welded to the underside of the rear end; the pivot arrangement for tilting the table is clearly Holes are drilled and tapped through the higs for taper-pointed screws, the points of which fit into 60° countersunk holes in the pillow-block base. Locknuts hold the screws, when tight-This pivoting arrangement, together with the elevating screw shown, makes an accurately working mechanism. The weight of the table keeps it down tight and firm while grinding. The horizontal arm is made sufficiently long to allow the work to be moved laterally; the height of the pedestal is also sufficient to permit the use of jigs and fixtures. Since the table has no longitudinal travel, it is necessary to move the work itself, passing it back and forth under the wheel, feeding it in or across with each pass, until the whole area has been surfaced. Bentwire frames are used to hold work that is too small to be fed by the hand, and on thin, flat stock, masks made of thin metal are used. Large work can be held and moved by C-clamps, as in Fig. 4, while a small toolmaker's vise comes in handy for holding many odd-shaped pieces of work.

As the work is slid back and forth under the wheel, it can readily be seen that the parallelism of the two surfaces must be exact. This feature is the most valuable characteristic of the machine, and makes for accurate quantity work.

For properly dressing and truing the grinding wheel, a diamond dressing tool is clamped in a small vise, held on the table, and brought against the wheel. The diamond point can be guided parallel

at a speed of about 2,500 r.p.m., which may be considered an entirely safe and efficient one.

An addition to the machine, which may be looked upon as a refinement,



A Small Bench Grinder of a Very Convenient Type for the Small Workshop: All the Parts are Easily Obtained, and the Finished Grinder Is Capable of Accurate Work

with the wheel by clamping a steel square to the table.

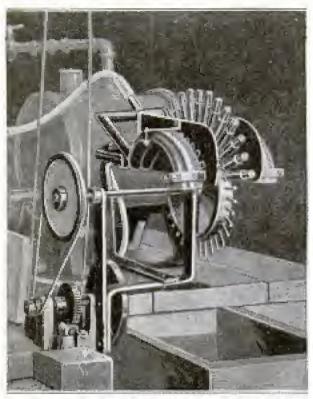
Work must always be fed under the wheel from the rear, against the direction of rotation, as in milling-machine practice and for the same reason—to prevent the wheel or cutter from pulling the work in. A 6 by 1-in. grinding wheel is a suitable size for use with this machine.

The spindle or arbor should be driven

would consist of a vertical screw for adjusting the height of the table accurately. This would operate in exactly the same manner as those used for elevating the bed of a drill press. The addition of the screw would, of course, require that a lug be welded to the side of the tee and another to the flange base, the lug on the tee being drilled and tapped to serve as a nut for the screw.

#### Machine Anneals Parts Rapidly

The machine illustrated is used for annealing the ends of caschardened shackle bolts, which are afterward inserted into



A Machine for Annealing the Ends of Casebordened Shackle Bolts Used in Automobile-Spring Suspentions: The Bolts are Placed on the Radial Pins of a Slowly Revolving Disk and Pass between Gas Flames

the shackles and headed over in a punch press. The operation is practically automatic, and it is only necessary for the operator to place the bolts on the projecting pins of the revolving disk.

This disk is a casting, into the rim of which the pins are driven radially; these pins are just large enough to fit inside the hole drilled through the center of the parts to be annealed. The disk is driven at a slow speed by the worm reduction gear seen at the left in the illustration. Gas and air pipes are arranged at each side of the disk so that an intensely hot flame is directed against the ends of the pieces as they slowly revolve. The operator places the parts on the pins at the front of the disk, and only a few seconds are required to bring the parts to be annealed to a red heat, which is maintained for the period it requires to pass between the double flame.

As soon as the parts have passed below the center of the disk, at the rear, they drop off into a box, where they are allowed to cool.—J. Brandstetter, Chicago, Illinois.

#### Miscellaneous Uses for Linseed Oil

In the spring, before putting up the door and window screens, give the screens a very light coat of linseed oil on both sides. This treatment will add to the life of the screens by preventing them from rusting.

When there are so many coats of paint on tin roofs that the heat causes it to blister and peel, discontinue the painting and apply an annual coating of linseed oil: this applies also to tin valleys and gutters,

Galvanized-iron downsponts from the gutter troughs begin to rust first on the inside. To prevent this, pour a small amount of the oil into the top of each spout once a year, just after a rain and while the inner surface of the spout is still wet. The oil will distribute itself quite evenly over the wet surface and provide a rustproof coating.—Arthur Thornton, McKeesport, Pa.

#### Perforated-Pipe Lawn Sprinkler

Along the edge of the pavement, in front of the city hall of a small town, runs a ½-in, pipe that is practically invisible, being half buried in the earth of the parkway. Holes, at intervals of I it., are drilled through the wall of the pipe at an angle of 45° to the pavement. The first



The Grass Plot along the Walk in Front of a City Hall is Kept Sprinkled during the Summer by a Perlorated Pipe, the Water having First been Used to Test Water Meters

impression is that the arrangement is installed primarily for watering the lawn but the sprinkling system has another use. A pipe line runs from the basement of the building, where the water meters used within the municipality are tested. When a meter is to be tested it is inserted in the line, the connections tightened, and the water, which would otherwise be wasted, is used for sprinkling. During the winter months, the water from the meter-testing bureau is run into the sewer.—Dale R. Van Horn, College View, Neb.

#### Hardening Small Coil Springs

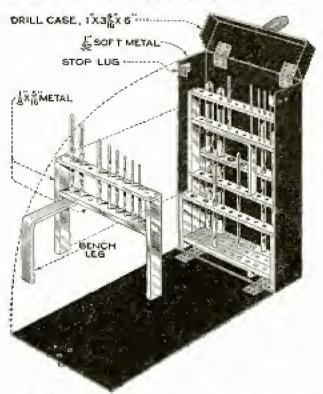
Small coil springs made of annealed steel wire should be hardened and tempered while held on an arbor. A process successfully used by jewelers is the fol-The soft wire is wound on a threaded arbor of the proper diameter; two small holes are drilled through the arbor, at a distance apart equal to the length of the spring to be wound, and tapped and fitted with large-head screws. One end of the wire is fastened under one screw head, the wire wound on the arbor, and the other end is fastened as the first, The assembly is heated to a cherry red and quenched in cottonseed oil. To temper, the assembly is removed from the oil, held over a flame until the oil on it ignites and burns off, then quenched again.

To blue a spring after hardening, it should be polished thoroughly, and be free from grease or finger marks. It should then be placed, while on the arbor, on a small metal plate, copper being best for the purpose, and the plate placed over a flame. The spring is rolled back and forth until a deep-blue color appears, then quenched in water. The finished spring is removed from the arbor, washed in soap and water, and rinsed and dried in hot sawdust.

#### Case for Small Drills

Twist drills, especially those of the smaller or numbered sizes, are difficult to keep in proper order when dumped into a compartment of a tool box; besides, time is consumed in hunting for the size wanted, and the drills are liable to injury from contact with other tools. To make all the drills readily accessible, so that the proper size can be selected without hesitation, and prevent them from damage, the case illustrated provides a neat addition to the mechanic's tool kit.

It is made of sheet metal, to any dimensions desired, although the size indicated is convenient for the tool chest. The top and front flap of the case are hinged and provided with a small hasp so that a split ring, or lock, can be used to keep it closed. Two angle pieces are fas-



The Numbered, or Smaller, Sizes of Twist Drills are Kept in Order, So That the Proper Size can be Selected without Delay, and the Tools are Protected against Damage

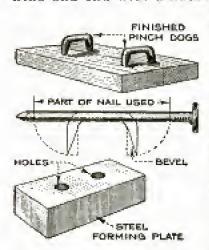
tened to the sides, inside and near the top, to serve as stop lugs for the flap cover.

The drills are held in their proper order in a series of graduated drill benches, made of flat stock. Each of these benches is provided with a leg that folds underneath, so that a series of drill sizes can be taken from the case and stood on the bench. Five benches, as shown, will hold drills from No. 1 to 80, although the last bench, which holds the sizes from 56 to 80, can be dispensed with if extremely fine work is not done. The size of the drills may be stamped on the upper crosspieces of the holders, or the numbers may be stamped on a piece of sheet metal to be attached a little below the top shelf.— P. A. Daschke, Astoria, L. I.

¶As a rule, timothy should be harvested for hay after the plants have passed out of full bloom, before any of the heads of the earliest plants have begun to turn brown, and before the seed has begun to mature.

#### Pinch Dogs Made from Nails

Inexpensive pinch dogs can be made from common nails by cutting off the head and end with a backsaw, and bend-

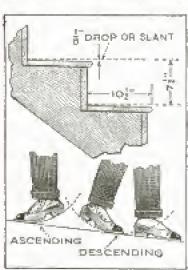


ing them into the desired shape and distance between the prongs. The prongs are filed on the inside to a flat sharp edge. Most patternmakers desire their pinch dogs to be interchangeable, and in this C3.50.

simple forming fixture can be made from a piece of flat steel. Two holes are drilled the desired distance apart and a little larger than the nail or rod used. The pinch dogs are then bent to the approximate size in a vise, after which the ends are placed in the holes of the fixture and driven down with a hammer.

#### Proper Angles and Dimensions for Steps and Stairs

Even the most casual observers have noticed that some stairways are much easier to ascend or descend than others, but why



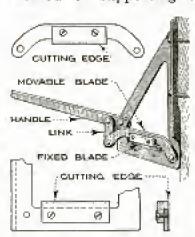
this is so, is not easily discovered. stairway is only a manmade hill used to connect planes at different levels. By referring to the lower part of the accompanying drawing, it will be seen that the human leg swings in an are, which necessitates a

certain amount of "clearance" or drop to the incline or hill the person is ascending or descending. This principle, if applied to the building of steps, makes them easy to climb. A slant of 1/s in given to the individual steps will be sufficient, and this is the secret used by expert stair-

builders for producing what is known as an "easy tread." A flat, or perfectly level, step, or one having a slant toward the back, compels the person to lift the foot high to clear the front edge, and then lower it again to make contact for support. Besides being tiresome to climb, such a stairway is the cause of accidents due to tripping. Tripping is usually experienced on the descent, and the feeling of unnecessary fatigue on the ascent. The height of the steps is another important feature of a properly designed stairway. To be at their best, the steps should not be lower than 71/2 in, nor higher than 7 % in. The width of the step, or tread, should be approximately 101/2 in. pitch of all stairs should be governed by these dimensions when the layout or design is made.

#### Powerful Shear Made of Bar Stock

The shears shown in the drawing were made in a sheet-metal shop, for cutting material too heavy for the usual cutters. The design is of special interest, as the method of supporting the fixed cutter



blade, and that of proyiding a powerful leverage with a simple linkage, are quite novel. The main frame is made from a triangular pièce of structural plate, cut out to leave a diagonal support for the

outer end. The long side of the frame is bent at right angles, and drilled for lag screws, by means of which the device is attached to a post or other support. The movable blade is attached to a lever pivoted at the rear of the frame, while the hand lever is attached to the outside corner of the triangular frame; a link to connect the hand and blade levers completes the shear. The blades are made of tool steel, hardened and tempered, and are removable, so that they can be sharpened or replaced easily.—G. A. Luers, Washington, D. C.

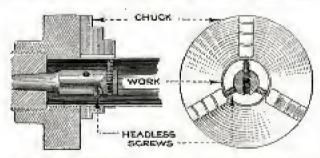
■Blueprints that have been slightly "burnt" can be brought out clearly by light sponging with peroxide of hydrogen.

#### Chucking Thin Tubes without Distortion

Thin brass or copper tubes are often distorted when held in a three-jaw chuck for facing or threading the ends. For this reason many lathe operators turn up pieces of scrap stock to fit the bore of the tube; this takes the thrust of the jaws, but a better method is shown in the drawing, whereby tubes of any diameter, from I in. up, can be adequately supported with very little extra work.

The body of this support is a piece of 1-in, steel turned on one end to fit the taper in the headstock spindle. front end is tapped for three %-in, headless screws, the holes for which are tapped clear through the piece and are equidistantly spaced around the circumference, to suit the position of the clinck aws. The device is set in the following

A piece of tubing of the size to be turned is first gripped lightly in the chuck. The support is then held in the tailstock and advanced, each screw being set in turn to touch the inside wall of the tube. The piece is then removed

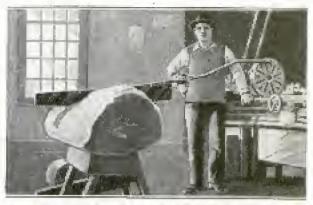


Support for Preventing the Distortion of Thin Tub-ing When the Jawa of the Lathe Chuck are Tightened Up

from the chuck, and the supporting device is placed in the headstock, after which it is necessary only to slip the work over the screws and tighten the chuck firmly. Care should be taken to have the three screws beyond the face of the chuck, so that large-size tubing, that will not enter the chuck bore, can be handled. Longer screws are used to support tubing of larger diameters,

#### Lathe Used to Saw Logs

A lot of back-breaking labor in sawing logs can be saved by harnessing the end of the crosscut saw to the faceplate of a lathe. The necessary attachment for the one-man saw is made by forging an eye on the end of a 34-in, rod, the opposite end of which is flattened and drilled to fit bolts for attaching it to the saw. A %-in. holt is used to fasten the rod to the lather faceplate, the bolt being an easy fit in the eye, to allow it to serve as a crankpin. The stroke of the saw can be adjusted by sliding the bolt closer to or away from



A Log-Sawing Attachment for the Engine Lathe That Relieves the Owner of a Lot of Back-Breaking Labor

the center, and its speed regulated in the ordinary manner; a weight, hung on the connecting rod, may be found necessary for rapid cutting.-Harry J. Bernhard, Pasadena, Calif.

#### Skid Used to Remove the Soil from Unbraced Excavation

When excavating material from a deep, unbraced sewer trench, two inclined poles were used to remove the soil to the sur-Planks were placed between the face. poles to form a smooth sliding surface for the drag scraper. The power for hauling the scraper was supplied by a team of horses hitched to the end of a rope; the poles served as guides for the scraper and supported the plank runway.



Skid Arrangement Used to Remove Excavated Material from an Open Sewer Trench: The Soil was Wheeled to the Bottom of the Runway and Dumped into a Drag Scraper, Which was Drawn to the Sur-face by a Team of Horses

The earth was wheeled to the foot of the skid in wheelbarrows and dumped into the scraper.—Allen P. Child, Kansas City, Missouri.

#### Blueprinting without a Frame

Good blueprints can be made without the use of a regular printing frame. It is

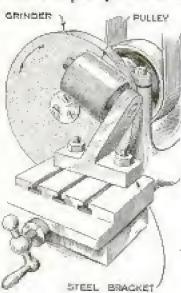


advisable to have at least one sheet of glass a little larger than the print, and another short of the same size for backing will make the job easier, although in its absence a piece of stiff cardboard can be used. A few paper clips around the edges of the glass will hold the improvised

frame together and the blueprint paper in close contact with the tracing, or negative, whichever is used.—H. K. Randall, Chicago, Ill.

#### Disk-Grinding Pulleys

Instead of the slow method of turning flat-faced pulleys in the lathe, the drawing



shows a quick and satisfactory method of doing the work that will equal the results obtained on the lathe. Place a steel bracket of the type shown, with a spindle onto which the pulley fits, upon the grinder table, fastening it so the pulley cannot come off but can re-

volve freely in contact with the face of the grinder. When the machine is started, the table is fed in until the pulley makes contact with the wheel. The result is that the pulley revolves according to the speed of the abrasive disk and in a few minutes the work is done.

#### Loosening Sticking Screw Caps

The screw tops on cans, jars, and similar receptacles, have the bad habit of sometimes becoming so firmly stuck that force sufficient to damage the cap is necessary in order to remove it. If it is desired to take off the cap easily and without damage so that it can be used again, a simple method consists in soldering two pieces of wire, or nails with points and heads cut off, across the center of the cap about 1/8 in. apart. This will produce a channel or groove, into which any straight-edged piece of metal can be inserted, so that sufficient pressure can be exerted to start the cap.—Leighton Powell, San Francisco, Calif.

#### Securing a Loose Valve Wheel

The usual method of fastening the valve wheel to a cast-iron valve is by means of a nut and washer, or a single screw on the end of the stem, but when either is ac-



cidentally broken off or lost the wheel may roll off and possibly become lost when urgently needed. To make a proper repair, the valve should be taken down and the broken part machined, but as this is impracticable in many cases, the valve is either left "as is," or some

effort made to fasten the wheel. shown, a nut and washer, and piece of wire can be used to make a serviceable repair. Run a thread-cutting die down the stem for a short distance; then file a slot on opposite sides of the washer and slip it on, followed by the nut. The wire is now twisted around one of the handwheel spokes, brought down through the slot on one side of the washer, up through the slot on the opposite side, and around a spoke on the other side of the These operations are then rewheel. versed, the wire pulled tight and twisted, after which the nut is given a turn or two to stretch the wire. The nut is then locked by a turn of wire around it.

To find the pressure in pounds per square inch of a column of water, multiply the height of the column in feet by .434.



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## Combination Tent and Pack Cover

BY C. S. TAYLOR

from (PORTSMEN and vacationists "rough-500 wing it," and carrying their own bed and board on their backs, or in a canoe, will appreciate the obvious advantages afforded by a tent that also serves as a cover for the owner's camp effects when not used as a shelter.

> There are two methods of making the tent illustrated: One is to use a rectangular tarpaulin, or other suitable material, which is twice as long as the width. Make a strong hem around all edges and sew brass or iron rings, as indicated, at the ends of the dotted lines. The fly, or front flap, is made separately, from a square piece of material, the dotted lines showing the folds of the shelter when it is set up. It is unnecessary to do any cutting of material in making a tent of this type.

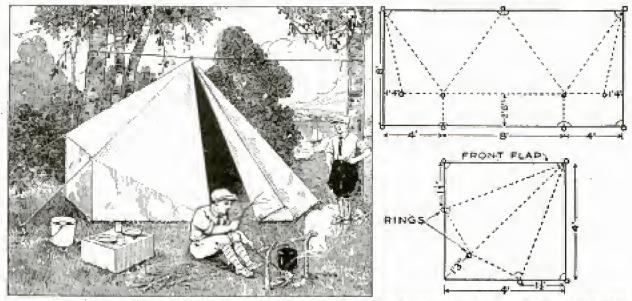
> The alternative method requires more or less cutting of the material, which is cut along the dotted lines as a pattern. The separate pieces are sewed together, This makes a with the seam inside. regulation tent, and by making a few paper models of different sizes, it is an easy matter to get the right proportions

for a tent of different dimensions from that illustrated. The tent in the drawing is a good average size, and for making it, a piece of material 8 ft. wide and 16 ft. long is needed. It is not necessary to have the cloth in a single piece, but this is an advantage. In using yard-wide goods the strips are sewed together with heavy waxed thread, the seams running lengthwise of the 16-ft. piece. To reinforce the tent at the corners, where the greatest strain comes when the tent is pegged and the guys in place, it is a good plan to sew patches of cloth on both sides, where the rings are sewed on. The tent is amply large for two occupants, and when set up is 8 ft. wide, 6 ft. deep, 7½ ft. high at the front, sloping to a height of 21/2 it. at the back wall.

For a light summer tent a heavy grade of unbleached cotton cloth is a good choice, although if heavier material is wanted, regulation canvas duck of several

weights can be used.

If a light nonwaterproof material is used, it can be processed and made to shed water by the following treatment: In 4 gal, of boiling soft water dissolve



For the Sportsman or Vacationist "Roughing It" in the Woods or Traveling "Light" in a Canoc, the Tent Shown in the Drawing Not Only Provides a Shelter at Night, but Serves as a Cover for His Personal Effects

½ lb. of powdered alum; also dissolve ½ lb. sugar of lead in another 4 gal. of water in a separate vessel, and when both chemicals are completely dissolved, pour the alum solution into a tub, and then add the lead mixture; let this stand for several hours, and pour off the clear liquid. This is used to saturate the tent material thoroughly. To make the cloth entirely waterproof, it is necessary to fix the acetate of aluminum in the fibers of

the cloth, and this cannot be done unless soft water is used. Finish the process by light rinsing in clean soft water, and hang up to dry. The sugar of lead used is a virulent poison, and should not be taken internally. Also, as some persons show a peculiar tendency to absorb poisonous lead salts through the skin, with accompanying bad effects, it is suggested that a stirring stick be used instead of the hands for saturating the cloth.

#### Novel Rubbish Box for Park

Receptacles for waste in public parks would not be such an eyesore as they usually are if made to represent animals,



like the one in the illustration. The outline of the animal is first drawn on a piece of wallboard, which is then used to mark the design on the sides of the receptacle. The sides are made of 1-in. boards, glued edge to edge,

and strengthened by flat-iron crosspicces. A good size for a receptacle of the type illustrated is 4 ft, high by 10 in. wide. The opening for rubbish is at the top, in the piece connecting the sides, and an opening, covered by a sliding hoard, should be cut in the bottom also, for convenience in emptying. Careful painting will add considerably to the effect of these novel boxes.

#### File for the Brief Case

An index file filler, of a size to fit the brief case, can be obtained from many stationers. This, when fitted into the case does not add appreciably to the weight, and letters, papers, and other documents are readily found under their proper index letter, and in perfect order, so that no time is wasted in hunting for what is wanted.

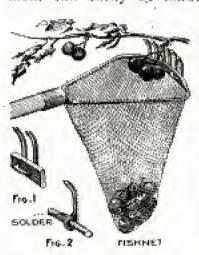
• ¶A mark at the top of the automobile steering wheel to show when the wheels are straight ahead will be found of much assistance in maneuvering the car.

#### Replacing Cylinder-Head Bolts

The last two bolts on the light-automobile cylinder head are located directly underneath the dash, and must be in place while the head is inserted on the engine block. To push the head into place, with these bolts protruding, results in the gasket being bent, torn, or disarranged. The usual practice is to have a helper who holds the bolts while the cylinder head is being put on or taken off. A simple solution to this problem consists in stretching a rubber band, made by cutting a piece from an old tube, around the two bolts, underneath the heads.—A. W. Michener, New York City.

#### An Effective Cherry Picker

For picking cherries rapidly with a minimum of climbing, an effective implement can easily be made. A frame is



made of stiff wire or light iron rod, the ends being brought together and forced tightly into a handle of the proper length. On the front of the frame a series of picking fingers, or hooks, are fastened. about 1/4 in.

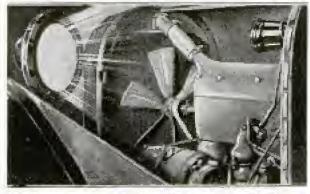
apart, so that the fruit cannot pass between them. Figures 1 and 2 illustrate two methods of attaching the hooks. Solder should be used in both cases, to make the fingers rigid. The device is completed by attaching a bag of close-woven fish netting to catch the fruit as it is plucked from the tree.— Wm, Melas, Philadelphia, Pa.

#### Auto Rim Incloses Flower Bed

To form an inclosure for a circular flower bed, a discarded automobile tire rim can be used. The rim is merely placed in the location desired, the central space filled with earth, and the seeds or plants put in. A larger flower bed of this character can be made by using the broad tires from wagons. By allowing about ½ in. of space at the top, the rim will hold water until the soil inside absorbs it completely.

#### Trouble Light on the Auto

The headlamps of several makes of automobiles may be turned about on their brackets to illuminate the entire space underneath the engine hood, and make repairs or adjustments to the engine at night almost as easy as in daylight. If the light is so built that it is not braced to the body of the car, it is very simple to turn it around. This is done by loosening the lamp-bracket nut, and turning the whole assembly around, or by removing the two nuts that hold the lamp to the bracket, lifting it off,



By Reversing the Position of One of the Headlamps of an Automobile, So That the Light Shines Backward, the Space under the Hood is Lighted

turning it around, and replacing it on the bracket. Of course, the method of mounting the headlamps will differ on various cars.

#### Homemade Garden Cultivator

A member of an Ohio garden club built the hand cultivator illustrated, at a total cost of a little over a dollar, obtaining with it results fully equal to those obtainable from the manufactured and higherpriced hand cultivators. Practically the only expense was the cost of having the cultivator shovels forged by a local blacksmith. The adjustable wooden frame that holds the cultivator shovels is arranged so that the implement can be set for shallow, medium, or deep cultivation. The handles are 5½ ft. long and 22 in. apart

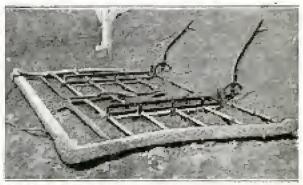


For Use on an Allotment in a Garden Club, One of the Members Built This Efficient Cultivator

at the outer end. The wheel, which may be one taken from an old baby carriage, or, better, from an old wheelbarrow, should be lined up exactly midway between the bandles.

#### Harrow Prevented from Injuring the Bark of Orchard Trees

Under some conditions of fruit culture, particularly in regions where rainfall is scant during the growing season, constant harrowing is necessary to maintain the moisture-preserving mulch. In order to make a good job, it is desirable to work as close as possible to the trunk of the tree, but in doing so, the bark is fre-

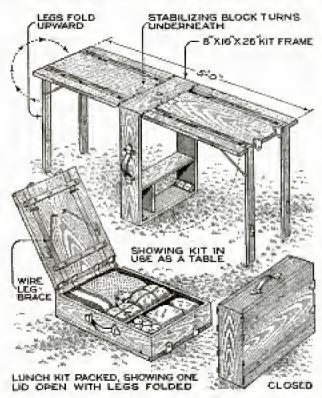


Old Automobile Tire Secured to the Sides of the Iron Harrow Frame, to Prevent It from Injuring the Bark of Fruit Trees

quently injured by contact with the barrow. The illustration shows the means used in one orchard to prevent this. Old automobile tires are cut and lapped over the sides and corners of the iron harrow frame, to which they are secured with wire.—W. L. Salvage, Beaumont, Calif.

#### Motorists' Folding Lunch Box and Table

For the automobile outing, when lunch is taken along, a compact and substantial combination lunch box and table can be



A Cleverly Designed Combination Table and Lunch Box for Automobile Excursions

made along the lines of the one illustrated. In use, the top and bottom hinged covers open horizontally, and a pivoted block, attached inside one end of the box frame, helps to stabilize the outfit. The legs are pivoted on a small iron rod and open downward; they are held rigidly vertical by means of wire braces, attached to the underside of the cover, the ends of the wires fitting into a hole on the outside edge of each leg. The legs are provided with buttons on the underside so that, when folded up in their slots, the buttons can be turned, locking the legs and forming a continuous cover.—Frank E. Leitch, Brooklyn, N. Y.

¶To remove plaster and lime stains from floors and woodwork, wash with a solution made by adding 1 pt. strong vinegar to 1 gal. Not water.

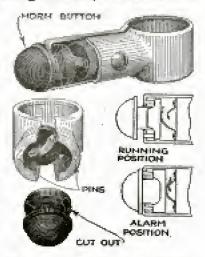
#### Making Enamel Flow Easily

Our handy man taught me to keep the can of enamel in a pan of warm water when using, so that it would flow easily. Also, when enameling such articles as a bedstead, to do all of one rod or spindle at once, so that the finish will harden Fewer coats of the warmed evenly. enamel are required than by the usual method of thinning it to the desired consistency with turpentine. By keeping the enamel warm and doing the work in a warm room, the finish will flow more easily and smoothly, and the danger of getting a lumpy finish will be greatly reduced. In all cases, where enamel is applied, it will be found better to apply two or more thin coats than a single heavy one.-Mrs, James Doremus, Passaic, N. J.

#### An Automobile Burglar Alarm

An alarm that sounds when the automobile is started is easily made for the light car, provided the original magnetooperated horn is used. The end of the case on the steering column, which carries

the horn button, is drilled on opposite sides to take two short pins, and the inner flange on the button is cut out to about onehalf of its original thickness at two places, as shown. When the button is in the run-



ning position, the pins fit into the cut-out sections of the flange. In this position there is no electrical contact. When leaving his car, the driver presses the button and gives it a quarter-turn. This causes the pins to bear on the higher or thicker part of the flange, keeping it pressed in, and establishing an electrical contact. When the engine is idle and the button is depressed, as shown in the alarm position, the horn is not affected, since it receives no current from the magneto. As soon as the engine is started, the flow of current from the magneto to the horn will cause the latter to blow, notifying the driver that some one is tampering with his car.—R. H. Kasper, Philadelphia, Pa.

#### Applewood for Smoking Meats

As a rule hickory is preferred for smoking meats, but as this wood is rapidly growing scarce, and does not occur plentifully in all regions, maple, birch, and other hardwoods are widely and satisfactorily used. It is not generally realized that applewood produces excellent results. Either the trunks or boughs of the trees are used. Thus, when old trees in an apple orchard are cut out, they should be sawed up and laid aside for use in the smoke house. Applewood produces a smoke that has a tendency to sweeten the product treated, and gives an excellent flavor.

#### Harness from Auto Tires

Since no stitching is required, and the material used is part of a discarded auto-



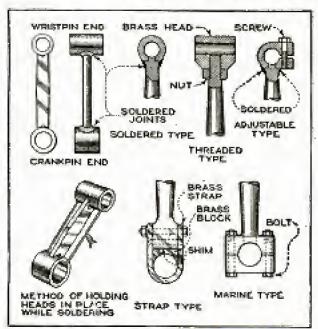
mobile tire. the halter illustrated can be easily made. Only the fabric part of the tire is used. the rubber tread being peeled off. The material thus obtained is then cut into strips of the proper length and width. The metal parts can be obtained from any hardware store; the buckles and

rings are riveted on. If bit straps are used in the metal loops on the cheeks of the halter, it can be used for driving or plowing. The appearance of the finished halter can be improved by a coat of black paint.—John Fowler, Regina, Can.

#### Connecting Rods for Model Machinery

Model builders and experimenters are often at a loss as to the best and easiest method of making the connecting rods and pitmen for models and machinery. To have them forged or cast is generally out of the question on account of the expense and time. The built-up connecting rod clears the way for quick work, and is not only strong and serviceable but it

also presents a good appearance. One of the simplest types of connecting rod is made by soldering or sweating tubing ends onto a notched shank. The design is laid out on paper and the exact dimensions found for the notched shank, or arm. Square or round stock, either solid or tuhular, may be used. The notches in the end are of 90° and are made with a square file. To make sure of the squareness of the notches, lay the tubing pieces in them and square them up with the eye. To solder the three parts, fasten them together with wire as in the drawing, and



Methods of Making Small Connecting Rods for Model Machinery, from the Simplest Possible Type to the Exact Reproduction of the Original

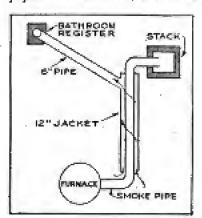
then apply the solder, allowing it to fill up the notch and build up a fillet in the angle between the shank and the tubing.

When using taper-turned pitman rods, turn a small nub, or teat, on the rod ends and drill the bushings accordingly.

A rod that is adjustable for length can be made by using a threaded arm and solid brass heads; a locknut is used to hold the setting and keep the parts tight, A connecting rod with semisplit bearing ends, which are adjustable for wear, is made by sweating the brass ends to the rod arm, splitting the heads and placing a screw as illustrated. The strap form of connecting rod is much used for engine work and is strong and of good appearance. It is also adjustable, shims being laid between the solid-rod end and the half-bushing. The rod proper may be made of brass or steel, and the strap and bushing of brass. The strap is held to the rod end by two flat-head screws, the bushing and strap forming the whole circamierence of the bearing. Where a solid and strong type of bearing is wanted, without regard for cost, a connecting rod is turned from rectangular stock and fitted with a lower cap, as shown for the marine-type bearing. This rod is adjustable for wear, shims being placed between the bearing halves, which are held together by bolts. When possible, it is advisable to insert two pieces of rod in the eyes of the bearing and square them up previous to soldering, in order to insure an accurate alinement of the bearings. If this is not possible, then check after soldering and bend until the eyes are square.

#### Auxiliary Radiator for Pipeless Furnaces

In houses that are heated by so-called pipeless furnaces, there is usually a spot,

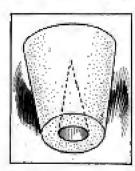


such as a bathroom, that fails to get its share of heat, and the diagram illustrates how an additional amount of heat can be conducted, under most circumstances, to that room. A 12-in. jacket,

around the furnace smoke pipe, has a 6-in, pipe joined to it near the upper closed end. The smaller pipe serves to carry the hot air to a register in the floor of the room it is desired to heat.—Jos. N. Parker, Richmond, Va.

### Repair for Vacuum-Bottle Corks

The action of hot coffee and other liquids contained in a vacuum bottle will cause the cork to lose much of its spring,



and allow the contents to leak after continued use. The old cork may be made as good as new by making a hole in the center of the small end with a sixpenny nail, or pointed lead pencil; this will expand the cork and make it fit tightly inside the neck of the

bottle. A small wooden plug, driven into the hole, will make the repair permanent. —William Mallet, Olympia, Wash.

#### Watering Young Trees

Thousands of young fruit and shade trees are set out only to die every year, not through neglect, but killed by kindness. In one instance, a number of apple trees were planted at the same time, and under identical conditions, and perhaps half the number were within spraying distance of a hydrant. Naturally, these trees received plenty of water at all times. The remainder were so located that it was necessary to carry water to them, and this was obtained from a rain barrel. During a prolonged dry spell, I was greatly amazed to find that the trees nearest the hydrant did not thrive, regardless of the amount of water supplied, while those watered from the rain barrel showed no signs of withering. In due course the first trees died out, and the elderly gardener who came to aid in replacing them explained that they had been killed by the frequent applications The water in the rain of cold water. barrel was usually warm, and for that reason, the trees upon which it had been used thrived as from natural showers. It is not necessary that the temperature of the water be more than 65 or 70°; this may be obtained quite naturally during the summer by allowing a barrel of water to stand in a sunny place. If the harrel is refilled in the evening, the water will as a rule be ready for use the following afternoon.—G. E. Hendrickson, Argyle, Wisconsin.

#### Carrying an Automobile Tire

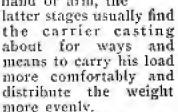
An automobile tire is not the easiest thing to carry for any great distance.

AUTOMOBILE,

TIPE

STICK .

Although the initial part of the trip may be made without undue strain on the hand or arm, the



The drawing shows a method of carrying such a load conveniently and with a minimum of discomfort and fatigue. The idea is simple and consists in the mere insertion of a stick of suitable length and thickness inside the tire so that the ends will bear against the tire walls.—H. C. Rose, Newport, R. I.

## An Improved Vertical Enlarger

BY F. E. HINKLEY

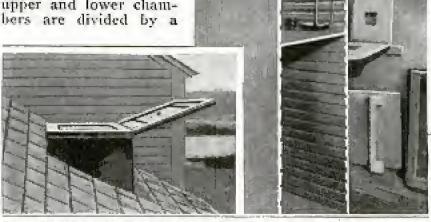
BY using the essential features presented in a vertical enlarger that I had once seen, and supplementing them with others for convenience in working, I made an instrument almost ideal in its adaptability for varying kinds of work.

The enlarging cabinet is made of 1-in. well-seasoned pine, grooved, and with particular attention given to have the grain of the sidepieces exactly similar, so that the contraction and expansion will be all in the same direction. This will

prevent cracking and warping. The door, and the back of the upper compartment, are paneled to allow for free expansion. The cabinet is 6 ft. 10 in. high, inside measurement. The upper and lower chambers are divided by a

straight-filament lamps, and a crown of seven sockets for concentrated-filament lamps at the top. This arrangement gives good distribution with whatever lamps used. I prefer, however, the concentrated-filament lamps.

In the wall directly back of the light frame are two flat brass springs, corresponding to two similar springs located in the frame. These sets of springs are for the purpose of automatically connecting the lamp circuit to the exterior wires,



Left: The Light Hood on the Roof of the Laboratory, Center: A View of the Cabinet, Showing the Frame Grooves. Right: Interior View of the Roof Opening; Part of the Pocusing Mechanism may be Seen on the Printing Frame

permanent shelf, 24 in. from the top of the enlarger.

The apparatus is crected in a low-roofed building, used as a laboratory, with the upper chamber joined to a short extension, leading out through the roof, as shown in one of the photos. I arranged for cutting off the light from the sky whenever desired, and, by means of a removable frame, holding electric lamps and placed in grooves at the top of the cabinet, am able to convert the enlarger into an instrument that can be used at night, and for purposes to which the daylight enlarger is not adapted.

This light frame, E, Fig. 2, occupies the grooves at the extreme top of the cabinet. It is made for the use of lamps in either a horizontal or vertical position, according to the kind available. There is a row of three sockets on either side of the frame, with one at the front and one at the back for regular 100-cp.

when the frame is pushed into place. The light is governed by a switch placed in a convenient position.

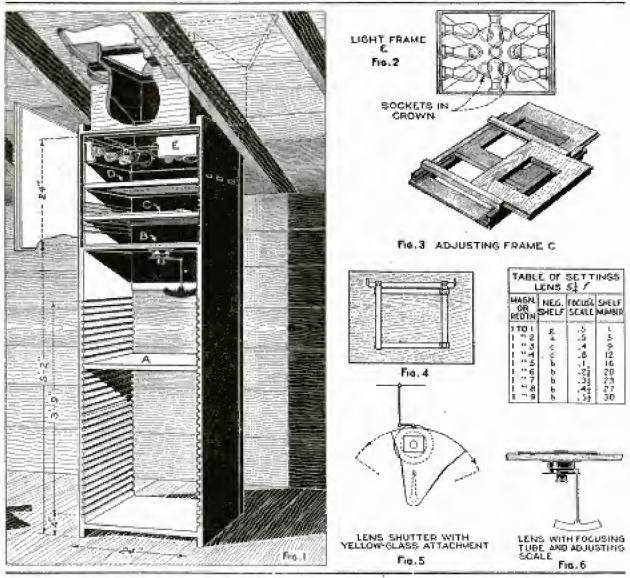
The next lower frame, D, Fig. 1, holding a 14 by 17-in glass ground

by 17-in. glass, ground on both sides, has also one fixed position in the center of the upper chamber, and is supported in grooves. By having the glass ground finely on both sides, I obtain good diffusion, and this also aids in cutting out undesirable reflections. The distance between the ground glass and negative frame is always sufficient to prevent the granulated appearance in the projected image that is observed when the ground glass is too near the objective focus. Between the frames E and D are some light-trapped holes to provide ventilation.

Three inches below the ground-glass frame, there are seven grooves, I in apart, the last one being 3 in above the permanent partition dividing the upper and lower chambers. These grooves accommodate the negative-adjusting frame C, Fig. 3. This frame is an assembly of three frames. The base frame has tongues on both sides to slide in the main grooves,

below the ground glass; it has also fixed guides at front and back, for holding in place the second thin frame, which moves from right to left. The latter has also fixed guides, at right angles to the first ones, for holding in place a third frame, which moves from front to back. The third frame has a rectangular opening for plates, or auxiliary frames, up to 8 by 10 in., and is self-centering by means of special spring clicks arranged to

shelf A, are cut at intervals of 1½ in., beginning with No. 1, 13 in. from the top of the lower chamber, and extending to No. 31, at the bottom of the cabinet. The printing shelf, Fig. 4, is a plain, flat, parallel board, 1 in. thick, provided on one side with an adjustable frame working as follows: A brass bar, shown at the top, revolves on its axis by means of pins through lugs, or ears, at both ends. The two vertical arms, sliding on this



A Homemade Vertical Enlarger of Wide Range: The Construction of This Instrument Is Well within the Ability of the Earnest Amateur, and It Affords a Means of Making Very Accurate Enlargements and Reductions. By Means of Adjustable Printing Frames, Any Part of a Negative may be Brought into a Central Position for Enlargement

engage in notches. This whole arrangement is very convenient for bringing any selected portion of a negative into a central position for enlarging. The grooves in which the base frame slides are marked "a" to "g," from the lower one upward, for use in connection with the table of lens settings.

The grooves in the lower compartment, for the accommodation of the printing

bar laterally, and the two horizontal arms, sliding on the first pair, give an adjustment in all directions. These arms are locked in place by thumbscrews, and their own weight is the working pressure on the paper. The frame is adapted for 10 by 12-in, paper, and smaller; for other sizes, the shelf is reversed, and the paper held in position by thumbtacks.

In the center of the partition B, which

divides the upper and lower chambers, is set the objective, mounted in the smaller of two focusing tubes, which screw one inside of the other, with the screw threads common to focusing mounts and arranged to be held where wanted by a clamping screw. tubes are approximately 3 in. in inside diameter, and give a lens movement of 1 in. The starting point being made at the center adjustment, there is an available focusing movement of ½ in. in either direction. This movement, in connection with the movable negative shelf, in grooves "a" to "g," forms the means of focusing, and, with the focusing scale and table of settings about to be described, gives a simple and accurate means of obtaining any range of enlargement or reduction with certainty.

The front, or what becomes the lower end of the inner focusing tube holding the objective, carries a projecting flange on which revolves a small wheel, or roller, in connection with a pointer extending in front of the focusing scale, shown below partition B, at the back of the cabinet, and in Fig. 6. The construction is as follows: On a horizontal shaft extending from the lens to the back of the cabinet, are attached two arms at right angles to each other, forming a bell crank; the smaller arm carries the wheel, or roller, and the other, or pointer, ends just in front of the index scale below, at the back of the cabinet. The proportional length of the lever arms is very nearly 1 to 5, to facilitate reading, a movement of .01 in. in the objective being clearly indicated on the scale. spiral spring, not shown in the drawing,

holds the wheel always against the lens flange when moved in either direction.

On top of partition B, above the lens, is located a shutter, Fig. 5, in a segment of thin tinplate, holding a frame containing a square piece of yellow glass. This is attached at the center of rotation to a pivot passing upward through the board, and at the lower end of this pivot is placed a hand lever, indicated by dotted lines in Fig. 5, which extends toward the outer edge to facilitate working. Three study or stops are arranged on partition B, to limit mechanically the movements of opening and closing of the shutter, when focusing or exposing the lens.

The lens employed is one of 51/4-in. focus, and the table of settings is arranged as follows: The first column gives in full numbers the magnification or reduction; the second gives the grooves for the negative shelf; the third gives the number representing the lens focus, obtained by turning the thumb flange of the focusing tube either to the right or left, until the proper number is reached on the scale below, and the fourth column gives the grooves numbered from one downward, in the lower chamber, for setting the paper shelf A in its proper position. By means of this table, the settings are made mechanically and with case and certainty. When the necessary tests and adjustments of the figure on the scale have once been made, an error in focusing is impossible,

The arrangement of this enlarger permits almost endless variations in adjustments between "natural or same size," to enlargements or reductions from one to

nine times.

#### Cleaning Soiled Leather

Soiled leather articles, such as puttees, shoes, traveling bags, and the like, can be cleaned by applying saddle soap with a moist sponge and rubbing with a clean, dry cloth. Oxalic acid, which is sometimes used alone and sometimes in preparations, for cleaning and bleaching leather, is injurious, and should not be Although it is almost impossible to remove oil or grease spots from leather, in some cases satisfactory results may be obtained by coating the spot with a thick and quick-drying rubber cement, then peeling off the coating when it is almost dry. It may be necessary to repeat this operation several times to clean the leather thoroughly.—A. C. Cole, Chicago, Ill.

## Keeping Oars in Rowlocks

When the beginner goes rowing he usually has the unpleasant experience of

pulling the oars from the rowlocks just at the time when it is most inconvenient. To overcome this and make learning to row easier, a heavy rubber band, cut from an old inner tube, can be placed across the ends of



the rowlocks. These prevent the oars from jumping out, although the rubber will stretch considerably without coming off the horns of the rowlocks.

### Mooring Boats in Tidal Waters

The square object hanging from the mooring post in the illustration is a wooden float. The post is driven into the



A Mooring for Small Boats in Tidal Waters: The Square Wooden Float Stides Up and Down on the Mooring Post as the Water Rises and Falls

bottom of a tide-water channel, and the float rises and falls with the tide, but is prevented from getting away by a cross-piece at the top of the stake. This arrangement provides a short-line mooring of constant length, serves better than the anchored buoy and rope for keeping small craft head-on to the wash of passing vessels, and is well adapted to places where wind and wave conditions are known to be quite regular.—L. R. Perry, Berkeley, Calif.

## A Window-Ledge Guard

In many apartment houses it is the custom to set vegetables, milk, and other foods on the window ledge, particularly



when the weather is cool. It frequently happens that these articles are knocked or blown off. Even if the windows do not face a street where falling objects might hurt pedestrians,

there is always the danger of breaking a skylight or other windows in their descent through a light well or court. To prevent this, a towel, or curtain, rod can be fastened in the window frame as shown in the drawing.

### Killing Dandelions

While beautiful in itself, a dandelion is a nuisance in lawns where a close, green turf is desired. The removal of the dandelions by cutting off the roots is a laborious and expensive process where they are at all numerous, and may do more harm than good. The dandelion is a perennial, and perpetuates itself by means of a long deep-growing taproot. To cut this root off a few inches beneath the surface of the ground does but little damage to the pest, and within a few days new shoots will appear. The cutting is also very likely to split the crown, and two plants will appear where but one grew before. However, if a tablespoonful of salt, or a half cupful of gasoline is applied at the cutting point when each root is cut off, the eradication may be made complete. This method is impracticable where the dandelions are numer-

If the dandelions are very thick, they can be controlled and practically eradicated by spraying them with a solution made by dissolving 2 lb. of iron sulphate or 2½ lb. of common salt in a gallon of water. The iron sulphate, which is known under a variety of other names, the commonest being copperas and green vitriol, comes in either granular or crystal form, and dissolves easily. One gallon of solution will spray 860 square feet.

On small lawns, the solution may be applied with a sprinkling can having very small perforations, care being taken to see that all plants are thoroughly wetted by the liquid. On large lawns or golf links, a hand spray pump, which is fitted with a nozzle for throwing a fine, mistlike spray, may be used. The fineness of the spray is important, as the finer it is, the better it will settle over all portions of the plant. Hand sprayers can he hought at varying prices, but the sprayer itself is not so important as the nozzle with which it is fitted. Insist on getting a nozzle that will give the necessary fine spray.

The spraying should be done after the dew is off, in the forenoon of a day when the weather indications show fair weather to be probable for 48 hours. Rain inside of 24 hours will undo the results, and make it necessary to spray again. Wait until three days after the lawn has been mown, as the iron sulphate injures new-mown grass. Do not sprinkle or mow the lawn for three days after spraying, but give the sulphate a chance to work. It may be necessary to spray

three or four times during the season, or even oftener, if the dandelions are very thick and have been allowed to go to seed once or twice. Scattering plants, which the spraying treatment has failed to kill, may be destroyed by placing a tablespoonful of the granulated iron sulphate on the crown of each plant.

Fertilizing the lawns to thicken the grass, and reseeding of the thin spots, will help to prevent reinfestation. Finely rotted barnyard manure is preferable as fertilizer, but the application of 100 lb. of sodium nitrate to 1,500 sq. ft. of lawn

will be helpful.

The salt solution referred to has at least two distinct advantages over the sulphate solution; it is cheaper, and will not stain walks, fences, or clothing with

which it comes into contact,

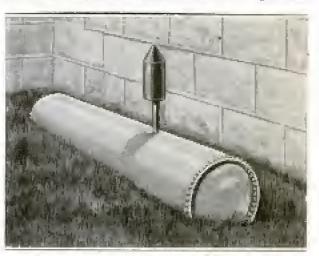
While this method of destroying dandelions has been found successful at the Wisconsin College of Agriculture, and has been shown, by seven years of investigation by the New York station, to be a dependable method, no permanent effects can be expected from spraying, so long as daudelions are allowed to go to seed unchecked on adjoining lawns, in fields, and along roadsides. It is undoubtedly true, that by community action in some form, either by agreement or ordinance, dandelions may be eradicated in an entire community, but it is useless for an individual to expect to keep the dandelions out of his lawn after the first treatment, unless he is willing to spray his lawn at least once in three years.—University of Wisconsin, Madison, Wis.

## Testing the Vacuum System for Leaks

A small leak between the intake pipe of the carburetor and the filling chamber of the vacuum tank of an automobile is revealed by the difficulty experienced in maintaining the proper fuel level in the tank, especially on heavy pulls or when climbing hills. A small air leak is difficult to find because of the loud suction through the carburetor. To concentrate the suction at the point of leakage in the fuel-tank connections, a simple and positive means is to loosen the bolts connecting the carburctor to the engine and insert a piece of tin or sheet brass, large enough to cover the intake opening; then tighten the bolts to hold the tinin place over the intake. By turning the engine with the crank, the increased vacuum in the intake produces a positive sound at the point of leakage, so that the location is readily determined.

## Muffler for Electric-Lighting Plant

The owner of an electric-lighting plant, located in the basement of his home, used the arrangement illustrated for muffling

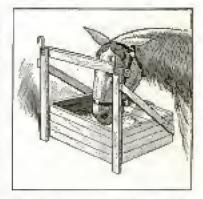


To Mussle the Exhaust from an Electric-Lighting Plant, the Owner Attached the Mussler of the Engine to a Discarded Water Tank

the exhaust from the small engine used to drive the dynamo. The exhaust pipe was led to the outside and screwed into one of the openings in a discarded water tank, the regular muffler that formed a part of the engine equipment being screwed on top of the tank, as indicated. To prevent possible explosion starting, a two-way valve, or cut-out, is installed in the line; this is opened at first, allowing the gases to escape before they reach the tank, Then, after, the engine is running smoothly, and no unexploded gas goes through it, the valve is turned, diverting the exhaust into the tank where it expands and passes, with little noise, to the air through the muffler.

#### Portable Feed Box

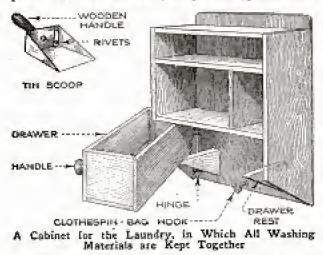
A teamster who is obliged to feed his horses at noon away from the barn uses the feed box illustrated, which can be slipped over the edge of the wagon box or a fence. This box pre-



vents the waste of grain attendant on the use of a nosebag, and does not occupy much more space.—Maggie A. Cromlich, Carlisle, Pa.

### A Handy Laundry Cabinet

A cabinet in which all necessary washing materials, such as soap, bluing, soap powder, and the like, may be kept in one



place will be appreciated by the laundress. The over-all dimensions of the cabinet illustrated are 5 by 12 by 20 in., and the swinging compartment, or drawer, which is used for soap powder or chips, is 4 by 5 by 10 in. If desired, a door can be fitted to cover the upper compartments. A hook is screwed underneath the soap drawer, from which the clothespin bag is hung. A simple scoop for handling the washing powder is easily made from a piece of tin and is kept in the drawer.

## Jack Head Saves Blocking Car

Sometimes it becomes necessary to make tire or other repairs on the road when the car is standing on a slight slope,



and, unless the brakes are in exceptionally good order, one is then obliged to find something to block one wheel while the other is jacked up.

To eliminate the need of scouring the roads and fields for a rock or piece of wood.

and to prevent the car from moving and dropping off the jack, the special head shown was formed from a piece of steel bar and attached to the jack. The use of this attachment makes it possible, when making repairs on a sloping surface, to throw the center of weight ahead or back by placing the front or back part of the head under the axle.

## Adjusting Vacuum Tubes to Voltmeter

If indicating instruments are used to adjust the filaments of vacuum detector tubes used in amateur wireless-receiving sets, a voltmeter should be used instead of an ammeter. Tungsten filaments show a decrease in current throughout their life, and if a constant current is maintained, rather than a constant voltage, the life of the tubes will be shortened, and the signals will be no better. The normal filament-terminal voltage for most standard tubes is from 5 to 5.4 volts.

## Improving Pack-Sack Straps

The common method of carrying the hiker's shelter and provisions is in a pack sack. When light loads are carried, no great strain is imposed by the sack, but when the weight is upward of 75 or 80 lb., the pressure on the shoulders becomes quite irritating. An improvement that will make its carriage easier and less fatiguing is shown in the drawing. This consists in using a short strap with a har-



ness snap on one end. The short cross strap is riveted to one of the pack straps, and the snap hooks over a ring fastened to the opposite shoulderstrap. Instead of the shoulders taking the whole strain, it is

distributed over the entire upper part of the body. If desired, the cross strap may be left unfastened until the load begins to feel "heavy," when it can be snapped in place and the shoulders eased.—Robt. P. Lincoln, Minneapolis, Minn.

## Blackening Brass

To blacken the brass work of cameras and similar fittings of the same metal, clean the pieces thoroughly, so as to free them entirely of grease, and dip into a solution composed of 200 gr. of copper nitrate to the ounce of water. After allowing them to remain for a few minutes in the bath, remove and heat until the desired color is obtained.

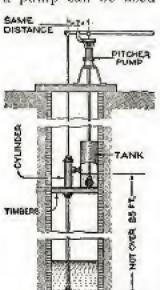
## Preventing Jars from Cracking during Canning

Some of the least-known reasons why glass jars crack in canning, when the containers are placed in the boiling water, and their remedies, are:

Overpacking the jars; such products as corn, pumpkin, peas, lima beans, and sweet potatoes expand, so that if the jar is completely filled it will be almost sure to crack. Do not fill the jars quite full. Placing cold jars in hot water or vice versa; as soon as the jars are filled with hot sirup or water, place in the canner. If the top cracks during sterilization, the wire fastener used on some types of jars was too tight. In a steam canner. cracked jars are often the result of too much water; the water should not come above the platform on which the jars are placed. Cracking is also caused by allowing a cold draft of air to strike the hot jars.—Mrs, Mary F. Scott, Albany, N. Y.

## Novel Pump Arrangement for Deep Wells

As the common pitcher pump will not pump water to a height of more than 20 or at the most 25 ft, above the water level, it is not generally known that such a pump can be used for pumping water



from a 50-st, well by raising the water in successive stages. A pump cylinder, set halfway between the pump and water, is operated by the upper-pump lever and delivers the water into a tank set at the same level, from which it is drawn up in the usual manner by the upper pump. The tank is supported on timber crosspieces. and has one end

open to admit the upper-pump suction pipe. The lower-pump cylinder is similar in bore and stroke to the upper one, and is attached to the upper end of the lower suction pipe. This is lowered into the well and connected to the tank. The plunger of the lower cylinder is connected to a rod fastened to the pump handle. In this manner, one cylinder discharges at each stroke of the handle.

## Photographing Small Articles with a Folding Camera

Flowers, and other small articles that are to be photographed, generally must be supported in some manner, and the



Small Articles can be Photographed More Easily with the Camera Arranged as Shown

materials used to hold the object in a vertical position usually form an undesirable part of the picture unless blocked out on the negative. Practically all the trouble of arranging the articles can be avoided by placing them in the horizontal plane and making the photograph vertically, as in the illustration, The ends of the camera, the lens pointing toward the floor, are supported on the backs of two chairs, which should be of the same height. The object being photographed is placed on a cardboard background that is raised by a stack of books to the proper level for focusing.

## "Swimming" in Wading Boots

Many fishermen have lost their lives by wading into water beyond their depth, and, burdened with wading boots, being unable to swim or keep afloat,

The drawing illustrates a method of keeping afloat used by a British sportsman. It should be learned by all fishermen, as very little practice is sufficient to master the idea so completely that it will be found possible to "shoot" rough waters.

be found possible to "shoot" rough waters.
Immediately the fisherman gets beyond
his depth or trips, he should draw the

knees up to the body, face downstream, and assume a sitting posture in the water. While the head is kept above water, there is, naturally, no danger even in rough,



Method of "Swimming" for the Fisherman in Wading Boots Who Goes beyond His Depth

rocky water. To keep direction, paddle with the hands on either side under the water, and if a rock is struck, the first contact is made by the feet and lower part of the thighs. Don't struggle or change posture, for the wash off the rock will help the body to clear it. On no account try to swim, for if this is done, the head goes under and the legs will come to the surface, and unless there is aid at hand there is great danger of drowning. Paddle with the hands, always facing downstream, until shallow water or a landing is reached. This method should be practiced in a pool about waist-deep, that runs downstream into shallow water.

#### Holder for the Ice Pick

There is no particularly good reason for misplacing the ice pick if a holder is provided for it near the ice box. dan-Since the instrument is a

children, it is essential that a holder be used that will keep the pick beyond their reach. Probably the simplest, yet most convenient, holder is one made from a window-shade

Missouri.



## Why Films should be Soaked in Water before Developing

Exposed photographic films, particularly those in a strip or roll, should always be run through a dish of clean water before placing the negatives in the developing solution. The reasons for first washing the undeveloped negatives are good, and the operation will prevent many spoiled pictures. The amateur photographer generally makes the mistake of using too little developer, so that the film cannot be completely and uniformly immersed in the solution. Unless the developer is evenly distributed over the surface of the film, streaks are bound to result. However, if the negatives are first washed, a thin film of water will adhere to the surface, and this will retard the action of the developer, so that the per-son doing the work will have time enough to get the negatives uniformly covered with developer before development really begins. Dry materials placed in liquids generally cause the formation of air bubbles, and these, on sensitized materials, show up as circular transparent spots on the negative, which, in turn, show black on the prints. Both of these troubles are avoided by the preliminary washing.

## Cooling City Drinking Water

Consumers of city water for drinking purposes are usually bothered by the high temperature of the water as it comes

WATER

PIRST FLOOR

M PIPE -

MAIN WATER

from the faucet during the summer months, which makes almost unfit for drinking unless cooled with ice. In order to lower the temperature of the drinking water, and make it palatable without the use of ice, the idea illustrated was successfully used.

A spot was located directly beneath the faucet, and a small section of the flooring was removed. Then, with a post-hole auger, a hole was bored about 15 ft. deep. The hole was about 8 in. in diameter. An 8-ft.

FLOOR OF BASEMENT 4" PIPE -HOLE IN GROUND length of 4-in, pipe was connected into the water line as shown, so that the water entered at the top of the large pipe and passed into the faucet connection at the bottom. After all connections had been made and tested, the hole was refilled with earth, and the flooring replaced. The coolest water is, of course, to be found at the bottom of the cooler, and is drawn off first. What little water is contained in the ½-in. pipe must be drawn off before the cooler water begins to come through the faucet: for this reason the small pipe is used, so that little water is wasted.—D. C. Stephenson, Augusta, Kan.

## Homemade Three-Pole Double-Throw Switch

Needing a three-pole double-throw switch for a wireless set, at a time when a commercial one was not easily obtainable, a very satisfactory article was improvised, the materials being a spool, with the flange on one end sawed off, three brass rods about 4 in, long, some

GROOVE TO RECEIVE ROD-

BRASS BOLTS AND NUTS,IZ REQUIRED

\$POOL

SXA'XI'

BAND

BASE

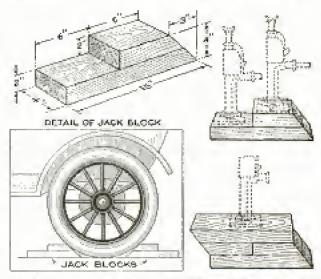
1/s-in. brass bolts, a rubber band, two thumbtacks, and a piece of hardwood. Three holes,



brass rods were pressed into the holes so that about an inch of each end extended beyond the spool. In the center of the hardwood block, which was used as the switch base, a 1/4-in, hole was drilled. The rubber band was run through this hole, through the central vertical hole in the spool, and over the middle rod, the ends of the band being fastened to the underside of the base with the thumbtacks. This arrangement held the spool down tight, yet permitted it to be lifted and revolved through 90°. The brass bolts forming the contact points were set into the base in four sets of three each, opposite each other. The heads were a trifle higher than the rods in the spool, and semicircular grooves were filed as seats for the rods. The necessary connections were made on the underside of the base.

## Blocks for Automobile Jacks

The handy pair of blocks shown in the drawing will more than repay the slight cost and trouble of making them, in the



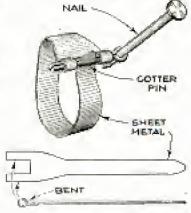
A Set of Jack Blocks, to Provide a Firm and Even Base for the Jack on Soft or Uneven Ground, and to Speed Up the Work

convenience that attends their application as indicated. The blocks can either be made from solid 4-in, timbers, or may be built up from 2-in, planks in the manner shown, and besides serving as a base for the jack on soft or uneven ground, they may be used for blocking the wheels of the car.—C. C. Spreen, Birmingham, Mich.

## A Universal Hose Clamp

For simplicity, the hose clamp shown in the drawing can hardly be excelled,

as it consists of nothing more than an ordinary cotter pin and a strip of sheet metal. It can be used on any size of radiator hose or wherever such a clamp can be applied. A strip of light sheet iron or



other metal is cut to the proper length and provided with ears at the outer end, as shown; they may be soldered or not as preferred. The opposite end of the strip is inserted through the slot in the cotter pin and pulled through as far as possible, after which it can be drawn up as tightly as desired by means of a nail.

## A Simple Radio-Transmitting Set

BY F. L. BRITTIN ..

A SIMPLE spark-coil radio-transmitting set can be used where messages are to be sent over a short distance. The complete outfit can be put into a small suitcase, and is well adapted to the needs of outers in motor cars or boats, and for

boy-scout field work.

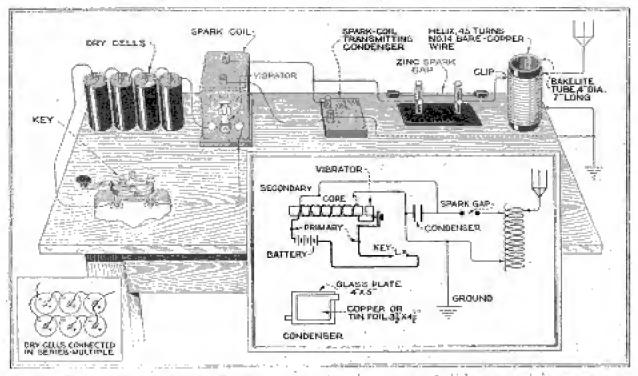
The necessary instruments composing the set are the following: a high-tension jump-spark coil, of which different sizes can be purchased, good results having been obtained for distances up to 16 miles with the ignition coil from a standard light automobile; a key, an ordinary telegraph key answering the purpose, and a spark gap, which may be made from two zinc-battery electrodes mounted in two upright fiber posts. A condenser and helix will also be needed; the condenser stores up the energy, which is then discharged across the spark gap, and produces the oscillations that are thrown into space from the antenna in the form of waves.

The condenser can be made from a number of glass plates with sheets of tinfoil between them. Old 4 by 5-in. or 5 by 7-in photographic negatives, from which the emulsion has been removed, will answer the purpose; the tinfoil sheets are cut ½ in. smaller than the plates, and a tab, or ear, is left projecting for connecting the lead wires to each sheet. In assembling the condenser, the

tinfoil sheets are placed between the glass plates so that the tabs of alternate pieces will project from opposite sides. condenser unit may consist of five sheets of foil and six glass plates. After assembling, bind the unit together and place in a cigar box, filling the surrounding space with melted insulating compound, or paraffin, to make a compact article for a portable set. If the transmitter is to be stationary, the condenser may be supported on wooden blocks in a pan, into which enough insulating or transformer oil to cover the unit is poured. Any desired capacity can be obtained by adding the proper number of condensers.

The helix consists of 45 turns of No. 14 bare-copper wire, which is wound around a grooved bakelite tube, 4 in. in diameter and 7 in. long. Spring clips are soldered to the wires from the aerial, ground, and spark gap, as shown in the diagram. Four dry cells give good results for short-distance work. When these are used, they may be connected in series, as shown in the upper part of the drawing; another method of connecting them is in series-multiple, as shown in the insert. This distributes the load, and makes the battery last longer.

At the present price of materials, and assuming that all the parts are bought, the total cost of such a set will be about



A Very Simple Transmitting Set for the Radio Amsteur: It can be Packed into a Suitcase, Making It Suitable for Boy Scouts or Similar Organizations. All the Instruments may be Made at Home, if Desired, Making This a Very Cheap Set, and One Well Adapted to the Needs of the Beginner

\$15, but this amount can be considerably cut by using materials that are usually available around the average workshop.

The acrial should be well insulated from the ground, but not with porcelain cleats, which should not be used for the aerial of a transmitting set. Solder all wire connections and make all leads short. The ground is important; have the ground wire as short as possible, and fasten it to a water pipe, if convenient, first filing the pipe bright, and either

soldering the wire to it or using a ground clamp.

If the set is to be used in the house as a stationary outfit, a lightning arrester, or ground switch, must be installed on the outside, to prevent lightning from following the wire into the building.

To operate a transmitting station, an operator's license is necessary. Full details of the necessary examination can be obtained from the radio inspector of the district in which the builder resides.

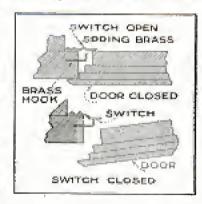
#### Making Sure of a Sharp Focus

Many photographic exposures, which were apparently sharply focused, turn out to be more or less "fuzzy," because, in fact, they were not properly focused. A simple remedy for this, which makes it possible to focus the image as sharply as possible, consists in using a small magnifying glass, or strong spectacles. This idea can be applied to getting a better view of the subject in the finders of small box cameras, particularly on cloudy days when the image does not show clearly.—Mrs. A. K. Hinkley, Rowley, Mass.

## Electric Light for the Refrigerator

Most refrigerators and ice boxes are so located that it is necessary to grope around in total or semidarkness to locate the article desired. All this can be easily overcome by fastening the socket for a

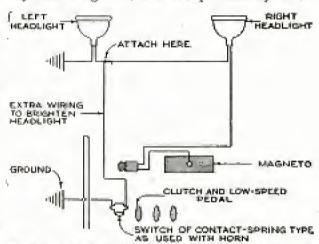
miniature dry-battery lamp any-where inside the food compartment. The light is turned on and off automatically by the simple contact shown in the drawing. A piece of



spring brass is fastened to the inside wall of the food compartment, and a brass hook is screwed into the edge of the door opening, in such a position that, when the door is closed, the spring contact will be separated from the hook, thus opening the battery circuit and turning off the light. As soon as the door is opened, the two parts of the contact come together and complete the circuit, causing the lamp to light.

## Switch to Brighten Auto Headlights

On a light automobile where the headlights are supplied with current generated by the magneto, the lamps usually burn



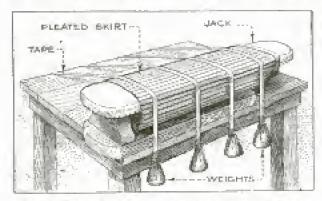
With This Wiring, One Headlight of a Light Car will Burn Brightly While the Car Rons at Slow Speeds

brightly when the car is running in high gear at slow speeds. For country driving, or wherever a bright light is desired with the car traveling at moderately slow speed, a simple arrangement for lighting one headlight brilliantly may be made by placing a push button, such as used for the horn, on the left side of the clutch pedal, running one wire from the button to a ground on the car frame, and another to the light, as shown in the diagram, When this button is pressed, the current flows only through the right lamp, causing it to burn brightly. The position of the button requires the use of the left foot to depress it, and consequently the car cannot be placed in low gear and the motor raced without releasing the pressure on the button, as otherwise the heavy current would burn out the bulbs .- G. A .-Lucrs, Washington, D. C.

¶A paper cone, slightly moistened inside the large end, can be used to remove small lamp bulbs that are difficult to grip with the fingers.

## Pressing Pleated Skirts Easily

An easy way to press a pleated skirt, without the trouble of pinning, is shown in the drawing. Strips of tape are fas-



Pressing Pleated Skirts, Capes, and Similar Articles of Wearing Apparel, is Made Easy by Means of the Arrangement Illustrated

tened to the wall or edge of the table, at the desired distance apart, behind the pressing jack. A weight is fastened to the free end of each tape. The pleats are laid in order and held in place by drawing the tapes across the top, allowing the weights to hang over the edge of the jack. The iron can be run over the tapes. This method can be used successfully for either hand or machine pressing.—Alex Mackey, Powers, Ore.

## How to Protect Lighting Fixtures When Using Vacuum Cleaner

Many a lighting fixture, to which a vacuum cleaner has been attached, has at some time or another been nearly pulled



from its fastenings because the
machine was
pushed farther
than the wire
would permit.
The idea illustrated is designed as a
"brake" on the
wire, and to give
warning to the
user before any
strain falls on the

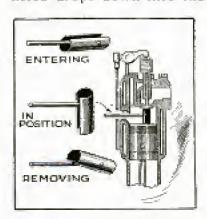
wire. A large rubber band is fastened across a loop made in the wire. 6 in, below the plug. The proper size to make the loop is found by stretching the rubber band as far as it can be done without breaking, and making the length of wire in the loop the same as the extended length of the band.—Mortimer V. Tessier, Nyack, N. Y.

### Emergency Gasket Made of Lamp Cord

While on an automobile trip the owner was annoyed by the blowing out of the copper gasket between the exhaust manifold and exhaust pipe, so that the smoke and exhaust gases blew into the tonneau of the car. No stock gasket could be obtained, so a piece of flexible copper wire was used; this was braided into a circular gasket, and served well until a new copper gasket could be obtained.—Chas. H. Willey, Concord, N. H.

## Tool Aids in Work on Overhead Automobile-Engine Valves

 As the overhead valve with which certain makes of automobile engines are fitted drops down into the cylinder when



the valve spring is released, the usual practice is to unscrew the valve cage and do the work at the bench. But by using the little tool shown in the drawing, the cage need not be removed, as

the valve is held in place through the spark-plug hole; this makes it possible to remove weak or broken springs and replace them with a minimum of time The tool is made from a and trouble. piece of sheet brass, about 21/2 in long, rolled into an open-sided cylinder, pivoted near one end on a handle, so that when inserted through the spark-plug opening, it will fall into an upright position under the valve. The engine is then cranked by hand until the piston comes up and holds the tool against the valve. the handle is turned upside down, the cylinder falls forward over the handle so that it can be withdrawn. A wooden handle is suggested to prevent injury to the threads of the spark-plug hole.

(Cut a hole in the side near the bottom of a wash boiler a triffe smaller than the hexagon on an ordinary faucet, and fasten the faucet to the boiler with solder. A locknut and washer on the inside will give additional strength. This arrangement makes it a very simple matter to empty the vessel.

## PRIZE OFFERS AND ANNOUNCEMENTS

#### URGED TO RETURN SOUVE-DOUGHBOYS NIRS TAKEN FROM RHEIMS CATHEDRAL

"Our doughboys went overseas with the sole and primary purpose of collecting souvenins," laughingly declared a famous war veteran on his return from France. While the statement was made in tun, it is France. While the platement was made in fun, it is nevertheless true that great quantities of souvenirs were brought back. In an appeal to Yankee fighters, the American Legion requests every member of the Expeditionary Forces who may have "salvaged!" a fragment of the Rheims Cathedral to send it back to Rheims. The French government has undertaken to reconstruct the historic clurreh, but cannot replace the priceless bits of statuary and other elements which have been taken by souvening thunders.

## HORSESHOE PITCHING TOURNAMENT TO BE HELD THIS YEAR AT IOWA STATE PAIR

The annual National Horseshoe Pitchers' Tournament for the championship of the world will be held this year at the Iowa State Fair and Exposition. Des Moines. The men's national tournament will be August 29-September 1; the women's will be August 30, and the Iowa State tournament for men will be August 28-29. A cash prize of \$250, with trophies valued at \$850, and other cash prizes, down to \$20 for sixteenth place, are offered for the men's events. The women's prize list includes cash prizes from \$25 for first place, down to \$3 for eighth place, with trophies valued at \$300. All entries, accompanied by a fee of \$2 for men, and of \$1 for women, must be sent in not later than Aug. 21, 1922.

#### STUDENTS OFFERED PRIZE FOR BEST O 52 TESSAY ON A HISTORICAL NOVEL

To promote a better knowledge of one of the greatest achievements in American literature, Kenyon College offers a prize of \$100 for the best essay, written by a student of any college or university in the United States or Canada, on "Gorgo, a Romance of Old Athens," by Charles Kelsey Gaines. Three typewritten copies of the essay, which must not be more than 4,000 words in length, must be submitted, and must reach Kenyon College, Gambier, Ohio, not later than Dec. 1, 1922.

PRIZE OF \$5,000 TO BE AWARDED EVENU

## PRIZE OF \$5,000 TO BE AWARDED EVERY

9 FIVE YEARS TO AN AMERICAN WOMAN
As a tribute to M. Carey Thomas, who is retiring from the presidency of the college, the Alumnæ Association of Bryn Mawr College is founding a prize of \$5,000, which will be awarded every five years to an American resemble. Assertican woman who has achieved eminence in some line of work. The award will be known as the "M. Carey Thomas Prize," Address, Publicity Committee of Bryn Mawr College, Alumnia Office, Bryn Mawr, 43.

#### U. S. CIVIL-SERVICE EXAMINATIONS FOR VARIOUS VACANCIES

Competitive examinations for assistant examiner Patent Office, will be held Aug. 23, 24, and 25, and Oct. 18, 19, and 20, 1922, in various cities and towns throughout the United States, Porto Rico, and Hawaii. Other vacancies in the Patent Office, with an inicial salary of \$1,500 a year and a bonus of \$20 a month, with provisions for promotion to positions paying from \$1,650 to \$3,900 a year, will also be filled from this examination.

this examination. Examinations for Examinations for valuation engineer and other vacancies on the technical staff of the income-tax unit of the Bureau of Internal Revenue, at \$3,500 to \$4,800 a year, are to be held in the near future. Applications for eligibility must reach Washington before Sept. 1, 1922.

The Langley Memorial Acconnuctical Laboratory, Langley Field, Virginia, is in need of a wind-tunnel.

Receipt of .

mechanic. The position pays \$1,800, Receipt of applications closes Aug. 15, 1923.

Applicants for any of the foregoing positions should write at once for Form No. 1312, stating the title of the examination desired. Address Civil-Service Commission, Washington, D. C.

## COLORFUL PAGEANT WILL BE STAGED . ON BOARDWALK OF ATLANTIC CITY

What promises to be a brilliant and colorful pageant will be staged on the boardwalk at Atlantic City, September 6, 7, and 8, according to plans approved by

tember 6, 7, and 8, according to plans approved by the local authorities.

"King Neptune"—to be acted by some one of international reputation—will be brought from the sea with his court of beauty, guard of honor, and slaves, on the first day in gayly decorated scaplages. Among the many events on the program is a beauty contest, a bathers' revue, a rolling-chair parade, automobile road mee, swimming meet, and a tennus, trapshooting, and golf fournament.

A statuette, representing a proposal and proposal for

A statuette, representing a merinnid and wrought in solid gold, is the prize to be won by America's most beautiful bathing girl. The figure reclines on a bowlder of granite which is mounted on a bronze base, molded to represent ocean waves.

INTERESTING PICTURES OF AUTOMOBILE

## WANTED BY MOTOR COMPANY

For the three most interesting or unusual photographs of the Chandler car, the Chandler Motor Company of Cleveland will pay cash prizes of \$100, \$50, and \$25. The contest closes before the end of the year, the exact date to be announced later. A short description of the scene should accompany each photograph submitted. All prints entered in the companions are to become the property of the motor company. company.

#### CONTESTS PREVIOUSLY ANNOUNCED

Medals, Diplomas, and Money Awards: Announced August issue, 1921; awards offered by the Franklin

Institute.

For Service to City of Philadelphia: Prize \$10,000; announced September issue, 1921; awarded each year by Edward Bok, former editor of The Ladies Home Tostenial.

Journal.

One Million Francs for Best Motor: Announced January issue, 1922; closes June 1, 1923; address, Aero Club of France, Paris.

Man-Propelled Airplane: Prize 20,000 francs; announced April issue, 1922; closes September 13; address, Maison Peugeot, 80 Rue Danton, Levallois-Perret (Seine), France.

Best Lists of Uses of Shoe Polishes: Prizes \$500, \$300, \$200, 10 of \$25 each, 20 of \$15 each, 50 of \$5 each, 50 of \$5 each, 50 of \$7 each, and 100 of \$1 each; announced April, 1922; closes Aug. 31, 1922; address, F. F. Dalley Company of New York, 277 Military Road, Buffalo, N. Y.

Dalley Company of New York, 277 Military Road, Buffalo, N. Y.
Annual Commercial Airplane Contest for "Italy's Great Trophy": announced, July issue, 1922; address, Aero Club of Italy.
For Best Lists of Uses for "Sanlo": Prizes \$50, \$25, \$10, and three of \$5 cach; announced June issue, 1922; closes Aug. 31, 1922; address, Contest Department, The Parker Sanlo Co., Inc., Rochester, N. Y.

N. Y.
Research Thesis by a Woman: Prize \$1,000; announced October issue, 1921; awarded annually; address, Dr. Lilian Welsh, Goucher College, Balti-

more, Md.

Ideas for New Occupations for Shut-Ins: Prizes, \$100, \$50, and \$25; nummered July issue, 1922; closes Nov. 1, 1922; address, Prize Editor, Popular Mechanics Magazine, 6 North Michigan Ave., Chicago, American Legion National Essay Contest: Prizes, \$500, \$500, and \$250; announced August issue, 1922; closes Oct. 6, 1922; address, The American Legion, National Americanism Commission, Indianapolis, Incl. Best Essay about Pasceur: Prize, 100 scientific books; announced August issue, 1922; closes, Sept.

1, 1922; address, Fédération de l'Alliance Française,
 32 Nassau St., New York City.
 Best Backyard Railroads: Prizes, 23, ranging arom
 \$25 to \$2; ananounced August issue, 1922; closes
 Sept. 15, 1932; address, American Physr Mig. Co.,
 2219-39 South Halsted St., Chicago, Ill.
 Pishing Contest: Prizes, Seven "Model 94" Win-

chester hunting rifles; announced July issue, 1922; no definite closing date.

Best Novel by an American Author: Prize \$2,000; announced August issue, 1922; closes March 1, 1923; address, Harper & Brothers, New York City.

Designs for Chicago Tribune Building: Prize, \$100,-600; announced August issue, 1922.

In answering prize offers please mention Popular Mechanics Magazine

FISHING THE ETHER

By George F. Staat & Every night on the stroke of seven.

I go fishing in the pond of heaven.

Hairlike hook and a crystal bait—

And I fish and I fish till the stroke of eight.

I cast a dozen miles from shore. Cast again a dozen more. With my thumb byon the reel, Till a sound-fish bite I feel.

Nibble, nibble—here they come, Till they make my tackle hum, Sound tish, wonderful and fine; Forty million on one line?

CONFESSION

By James A. Sanaker

Not like one on the mountain top Who, gazing down below, Looks calmly at the shifting throng Which rushes to and Iro.

Not like the thinking man who plans (

Bach more to be just so,
Whose wisdom always buts him wait,
Whose watchword cries, "Go Slow!"

But, fike a million other souls, Quite theilitess here below, I caught the latest fad and fell, I bought my radio.

## NEW BOX-TESTING MACHINE TIP AT FEDERAL LABORATORY

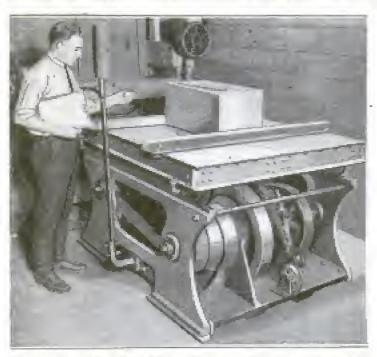
The shaky rough-riding action of a freight car is imitated by a new box-testing machine in use at the Forest Products Laboratory, Madison, Wis. The boxes are placed on a heavy, low steel table, which is then operated by a series. of motors "tuned" to reproduce faithfully

the vibrations of a moving freight car. The machine was designed by engineers of the Department of Agriculture,

WILL WIRE OFFICE BUILDING FOR RADIO INSTALLATIONS

For the first time in the litstory of Pacific-coast office-building construction, a 15-story skyscraper in San Francisco,

erected by a navigation company, will be wired throughout for radiophone installation. Tenants wishing to put in a receiving set will only have to "plug in" to a wall socket, as for a desk lamp, to be connected with the antenna on the roof and receive broadcasting programs from stations in, San Francisco and vicinity. Notonly will the new building be completely wired as a convenience to tenants who are radiophone... enthusiasts, but the company intends to install a powerful sending and receiving set, with which it is expected it will be possible, to give orders to the captains of the company's nine freight and passenger ships, which maintain a weekly service between San Francisco and the Hawaiian Islands. Within the next year the company hopes to be able to talk by \ radiophone with its agencies in the islands.



A Close-Up of the Box-Testing Machine: The Lever Controls a Series of Motors Which Give the Table the Shaky Motion of a Moving Preight Car

IN accordance with the editorial policy of this magazine never to accept compensation in any form for what appears in our reading pages, and also to avoid all appearance of doing so, we are obliged to omit the name of the maker of the seller of any article described. This information, however, is kept on file and will be furnished free, by addressing Bureau of Information, Popular Mechanics Magazine, Chicago. [Editor.]

# Use it—and you will see the difference



Pocket sun dials tell time, yet you prefer an accurate watch, though it requires winding. Similarly, for 25c or less, you can buy a toy kind of clutch pencil with wobbly, uncertain point—but you prefer a finely made pencil of precision—like EVERSHARP.

The principle of operation that makes EVERSHARP write with satisfying smoothness and surety depends on the exclusive rifled tip that keeps the lead from slipping and wobbling. The success of this rifled tip is the success of EVERSHARP—and no other pencil can use this rifled tip.

Supplementing the perfect EVERSHARP tip are other excellent features that contribute dependability, convenience, beauty—all in every EVERSHARP, regardless of what you pay.

Select your EVERSHARP today—or get an extra one for your desk. Gold, silver and enamel finishes; priced from 50c to \$50. Sold everywhere.

Made in U. S. A. by
THE WAHL COMPANY, CHICAGO
Canadian Factory, THE WAHL COMPANY, Ltd., Toronto

EVERSHARP



EXCLUSIVE RIFLED TIP

The supreme point of efficient writing. Lead held firmly; cannot allp nor wobble.



HANDY ERASER UNDER THE CAP Eraser free with every box of Evershare leads.



Sold completely loaded. Extra lead in the Redtop box, 15c everywhere. Seven grades of lead, also indelible,



## Science keeps down costs

When the Bell System installed its first successful telephone cable, fifty wires was the largest number that could be operated in a single cable without "cross-talk" and other interference. Today it would require 48 cables of the original type to accommodate the number of wires often operated in one cable.

Without this improvement in cable, the construction of new underground and aerial lines would have cost the Bell System upwards of a hundred million dollars more than has actually been spent. In addition, the cost of maintenance would have been greater by eighteen million dollars a year. These economies in the Bell System mean a saving in telephone rates to each individual subscriber.

In all branches of telephone practice

science has similarly contributed to economy. Even in such a comparatively small item as switchboard cords, improvements have reduced the cost of renewal by four million dollars a year.

Every new telephone added to the Bell System increases the usefulness of all telephones, but this multiplication tends likewise to increase the complications and the expense of service. The scientists of the Bell System, to offset this tendency, are constantly called upon to develop new devices which simplify complications and keep down costs.

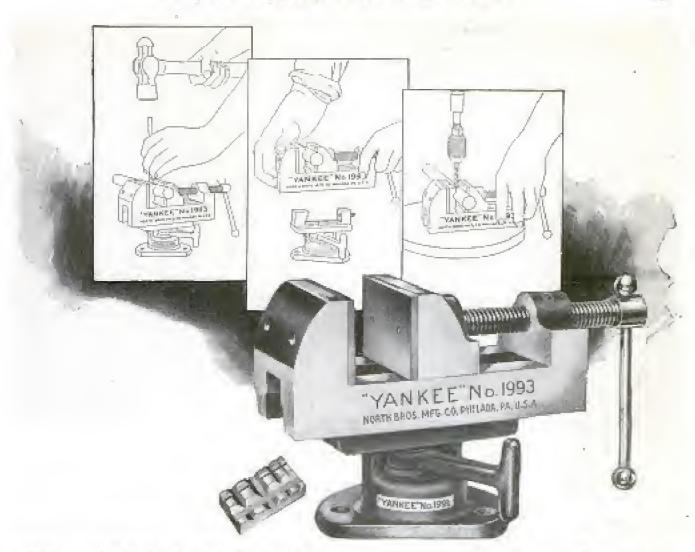
By virtue of a united system the benefits of these improvements are shared by all subscribers—and the nation is provided with the best and cheapest telephone service in the world.



"BELL SYSTEM"

AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES

One Policy, One System, Universal Service, and all directed toward Better Service



# The "YANKEE" Vise stands by the job

## Some other "YANKEE" Tools

Ratchet Breast Drills
Ratchet Hand Drills
Ratchet Chain Drills
Ratchet Chain Drills
Automatic Push Drills
Ratchet Bench Drills
Spiral Screw-drivers
Quick Return Spiral
Screw-drivers
Plain Screw-drivers
1½ to 30 in, blades

Dealers everywhere sell "YANKEE" Tools "When a job must go through quickly and be absolutely accurate, I lock it in a 'Yankee' Vise. The vise with work in it is detached from base, It goes from machine to machine and back to bench in the original alignment." Sides, top and bottom of the vise machined true. Can be locked in any position. Removable steel block with V-shaped grooves holds round or irregular work.

#### "YANKEE" VISES with Swivel Base

No. 1991—Body 3% in. long, 11% in. wide, Jawa open 11% in.; depth 3% in. No. 1992—Body 47% in. long, 2 in. wide, Jawa open 11% in.; depth 11% in. No. 1993—Body 73% in. long, 2% in. wide, Jawa open 31% in.; depth 13% in. No. 1994—Body 101% in. long, 4 in. wide, Jawa open 4 in.; depth 21% in.

Without Base As above: Nos. 991, 992, 993, 994

Interesting Tool Book FREE, Illustrates and describes all the ingenious "Yankee" Tools for saving time and labor. Write enday for it.

NORTH BROS. MFG. CO.

Philadelphia



# "YANKEE" TOOLS

Make Better mechanics



## Teeth You Envy

## Are brushed in this new way

Millions of people daily now combat the film on teeth. This method is fast spreading all the world over, largely by dental advice.

You see the results in every circle. Teeth once dingy now glisten as they should. Teeth once concealed now show in smiles.

This is to offer a ten-day test to prove the benefits to you.

## That cloudy film.

A dingy film accumulates on teeth. When fresh it is viscous—you can feel it. Film clings to teeth, gets between the teeth and stays. It forms the basis of cloudy coats.

Film is what discolors—not the teeth. Tartar is based on film. Film holds food substance which ferments and forms acid. It holds the acid in contact with the teeth to cause decay.

Millions of germs breed in it. They, with tartar, are the chief cause of pyorrhea. Thus most tooth troubles are now traced to film, and very few escape them.

## Must be combated

Film has formed a great tooth problem. No ordinary tooth paste can effectively combat it. So dental science has for years sought ways to fight this film.

Two ways have now been found. Able authorities have proved them by many careful tests. A new tooth paste has been perfected, to comply with modern requirements. And these two film combatants are embodied in it.

. This tooth paste is Pepsodent, now employed by forty races, largely by dental advice,

### Other tooth enemies

Starch is another tooth enemy. It gums the teeth, gets between the teeth, and often ferments and forms acid.

Nature puts a starch digestant in the saliva to digest those starch deposits, but with modern diet it is often too weak.

Pepsodent multiplies that starch digestant with every application. It also multiplies the alkalinity of the saliva. That is Nature's neutralizer for acids which cause decay.

Thus Pepsodent brings effects which modern authorities desire. They are bringing to millions a new dental era. Now we ask you to watch those effects for a few days and learn what they mean to you.

The facts are most important to you. Cut out the coupon now.

## 10-Day Tube Free

THE PEPSODENT COMPANY, Dept. 171, 1104 S. Wabash Ave., Chicago, Ill. Mail 10-Day Tube of Pepsodent to

andy one tube to a family.

# Pepsadent

## The New-Day Dentifrice

Endorsed by modern authorities and now advised by leading dentists nearly all the world over. All druggists supply the large tubes.



## The Greatest Musical Catalog Ever Published

Over 3,000 Musical Articles - Every Known Musical Instrument Fully Described



The Rudolph Wurlitzer Co.

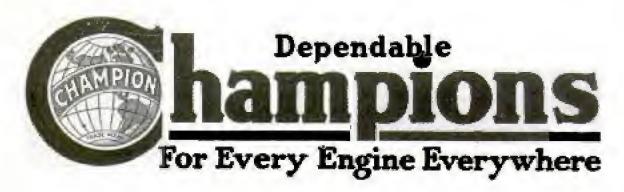
Cincinnati

Chicago

New York

San Francisco

(State instrument in which you are superially interested)



# Insure Your Engine



Champion X . . . now 60c Champion Regular now 75c

Champion accuracy in construction assures absolute uniformity of spark in each cylinder; consequently a more perfect timing of the engine

Ask your dealer to sell you a full set.

CHAMPION SPARK PLUG CO.

TOLEDO, OHIO



# GOODELL-PRATT 1500 GOOD TOOLS



Calipers, Steel Rules and Surface Gauges in all the standard styles and sizes.

# "Accuracy is my family name," says Mr. Punch

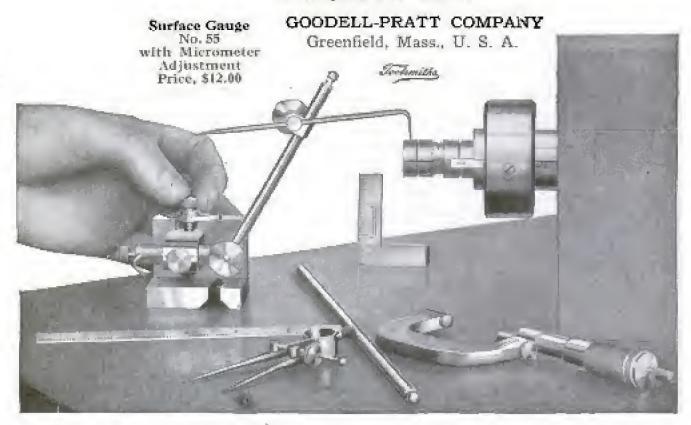
You've got to buy measuring instruments and precision tools — micrometers, gauges, calipers and steel rules — largely on faith. The reputation of the maker is your best guarantee of accuracy.

The confidence and faith that mechanics, artisans, and other workmen have in the Goodell-Pratt 1500 Good Tools is never misplaced. Before you buy another steel rule, measure it up with a micrometer.

## Exceptional accuracy—the result of taking pains

If you could see the infinite pains taken in the making of all Goodell-Pratt 1500 Good Tools — you would realize why so many thousands of workmen have such faith and confidence in the Goodell-Pratt Tools they use.

Your hardware dealer has Goodell-Pratt Tools or can get them for you. Talk to him. Meantime, write for a copy of our new machinist tool catalog picturing and describing the very tools you have always wanted to call your own. It's free.





Topeka, Kans.

SANTA FE WATCH COMPANY

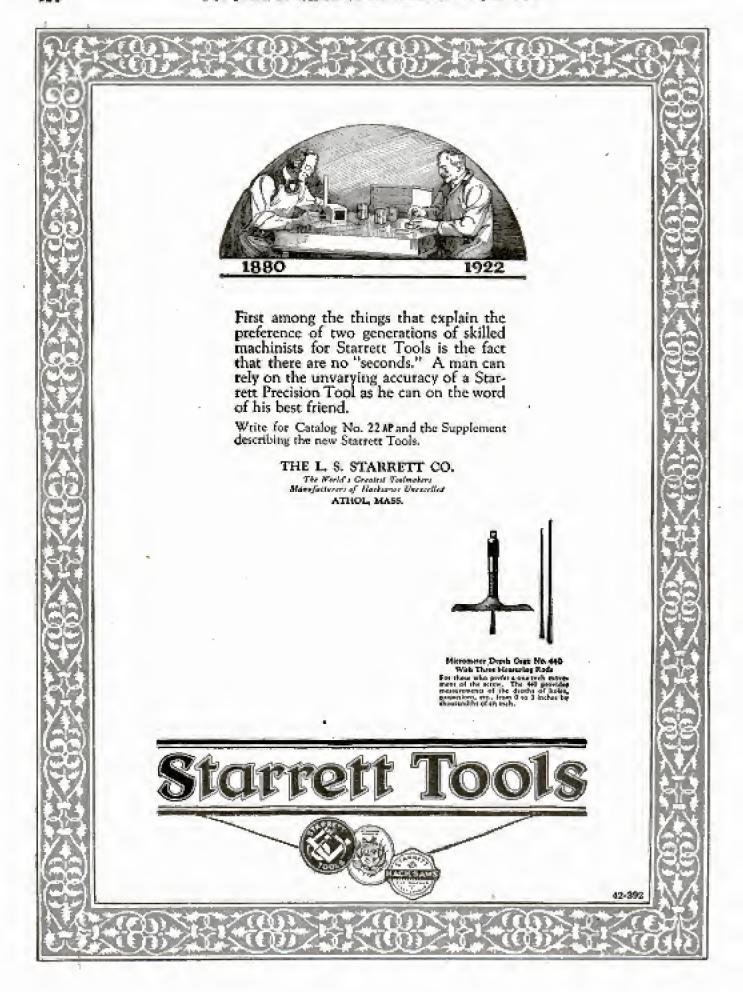
96 Thomas Bldg.

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SANTA FE WATCH CO., 36 Thomas Bldg., Topeka, Kans.

Please and prepoid and without oldigation your Warch Rock Tree, explaining your "No Money Down" Offer on this Sunta Fe Special Watch.

Address



# I Want A \$5000 Man in Every Town

This is nothing more than a "Help Wanted" Ad—But it offers you the most amazing opportunity in years. You may not be the man I want—but if you are—I'll Show You How You Can Earn From \$5000 to \$7000 a Year

## The Proposition

One of America's largest woolen mills, Taylor-Wells & Co.—for the first time in the history of woolen mill merchandising has decided to manufacture and sell-directly from the mills to the wearer all wool products—overcoats, work-pants, bed-blankets, auto-robes, raincoats and suits, fashioned from their own woolens. An organization of special representatives is now being formed to represent Taylor-Wells & Co. in exclusive territory. In view of the fact that this organization is to be composed of the best grade of men I can secure—I am going to be mighty particular about—

## The Man

He need not have selling experience. But he must possess toyalty, honesty, sincerity and a good reputation in his community. I do not want every Tom, Dick or Harry. I want men of whom we will be proud—and who in turn will be proud of us and our merchandise. I know our products to be of the highest grade and I want men of a like calibre.

## His Earnings

Conservatively estimated a special representative should earn from \$5000 to \$7000 a year. The demand for our products will be great. Selling direct from the woolen mills to the consumer—we can sell all wool merchandise at a price so low as to be astonishing. Our representative will practically build a business for himself in his territory. Customers who buy Taylor-Wells all wool products stay customers.

## His Future

The sales organization now being formed is in its infuncy. Within a short time District Managerships will be open. The men who join us now—and who "make good" place themselves immediately in line for a District Managership which should not him \$10,000 a year and more. The ambitious man with the determination to succeed will have no trouble in "landing" one of these openings.

## Why You Must Act Quickly

This may be your one big opportunity. Do not delay! Write use immediately and use the coupen below for full details of this amazing opportunity. Territories will be going fast—so if you believe yourself the "right man"—harry!



TAYOR-WELLS & CO.
Dept. 229, 2740 N. Paulina St., Chicago, Ill.
"From the Mills to the Millions"



## Take a Tip From Me

I've been in the selling game and sales promotion field for years—and when I tell you that this opportunity which is now offered you is absolutely the most amazing selling plan I have ever seen—I know what I am talking about,

You don't have to be a genius or a "star salesman" to "make good." If you've got grit and determination—you can't help but make good! I know it! Figure it out for yourselt. Here is a gigantic woolen mills manufacturing high-grade merchandise from its own woolens—and selling them direct to the wearer. Can't you see the startling saving that the consumer gets!

I haven't the space to tell you all I want to say to you. But if you are the "right man" —mail the coupon—and let me give you the full details. They will surprise you!

G. H. LANDER, Gen'l Sales Mgr.

	TAYLOR-WELLS & CO. Dept. 229, 2740 N. Paulina Se. Chicago, Illinois.
	Attention, Mr. Linder: I am greatly interested in your proposition. Would like to represent you, and would appreciate your sending me full details of your remarkable-selling plan.
1	Many
١	Address
1	City, State

# \$5.\$6.\$7. & \$8. SHOES FOR WOMEN

FOR MEN

THE STAMPED PRICE

ES YOUR PROTECTION AGAINST.

UNREASONABLE PROFITS

ones the Alian Prof. At the Backey WEAR. W.L.DOUGLAS SHOES AND SAVE MONEY. THE BEST KNOWN SHOES IN THE WORLD THEY ARE MADE OF THE BEST AND FINEST

LEATHERS, by skilled shoemakers, all working to make the best shoes for the price that money can buy. The quality is unsurpassed. Only by examining them can you appreciate their wonderful value. Shoes of equal quality cannot be bought else-where at anywhere near our prices.

OUR \$7.00 AND \$8.00 SHOES ARE EXCEP-TIONALLY GOOD VALUES, W.L.Douglas shoes are put into all of our 108 stores at factory cost. Wedo not make one cent of profit until the shoes are sold to you. It is worth dollars for you to remember that when you buy shoes at our stores

#### YOU PAY ONLY ONE PROFIT

SEE THAT THE NAME AND PRICE IS STAMPED ON THE SOLE. Do not take a substitute and pay extra profits. Order direct from the factory and save money.



Established 1876 Catalog Free

Lo Douglas W. L. Douglas Shoe Co.

128 Spark St., Brockton, Mass.

## and Fly Model eroplanes





New you can buy famous; 9-pound National Type-writer direct from the fac-tory, after 10 days' trial-absolutely free. You be the judge. Then we give you

#### 10 MONTHS TO PAY

S4 characters. Brand now free with every machine. Send today for our Paymer Free Trial offer and 10 Months: Easy Payment Plan.

NATIONAL TYPEWRITER CO.

Dept. 7-1.

10 Months

Fond du Lac, Wis.

#### .ES on Gallon of Gasoline



Wonderful carburetor. Reduces gasoline bills one-half to one-third. Increases power of motors 30% to 50%. Starts easy in coldest weather.

## Sent on 30 DAYS' TRIAL

Fits any car. Attach yourself. Fords make as high as 34 miles to gallon. Other cars show proportionate saving. Send make of car. Special 30-day trial Agents Wanted.

AIR FRICTION CARBURETOR CO.

Depton, Obla

liaer Agents Wanted

Select from the 44 Styles, colors and sizes of Ranger Bleyeles, Ride and exhibit sample Ranger and make money. Delivered free, express Bleisald, on Approval. Factory-to-Rider pricessave 600 to 826, 12 Months 10 Pay on any Seager Hewined. Buts and Delivered. Parents often odrared file sizes. Buts and published. Parents often odrared first payment.

Tires had graftly, at factory prices, suprem proposid, the Money, do business direct with makers. Write teclar, 6.

lead Cycle Company
Senger Catalog, Sacrification and marriage Company
Dept. Fits Chicago

## EXTRA—The American Duplex

a new Key cutting machine ready set to cut square, angular or round slots. For particulars, address

AMERICAN SHARPENING MACHINE CO.
Dept. 9, 184 W. Washington St. Chicago

Chicago

## **Agents Wanted** An auto owner in each local-ity to use and introduce Mellinger EXTRA-PLY and CORD Tires

Make big money part or full time. No capital or exper-tence needed. Sample Sections furnished, GUARANTEED

8,000 and 10,000 Miles (No Sec-transfer made. Effect materials. Shipped prepaid on approval.

FREE Tires for Your Car to one user in each leadily for taking a few orders. So first to write quick for Special Account Offer and Low Wholesale Price

MELLINGER TIRE & RUBBER CO. North Oak Street Kansas City, Mo-



# Selling Motors Below Cost

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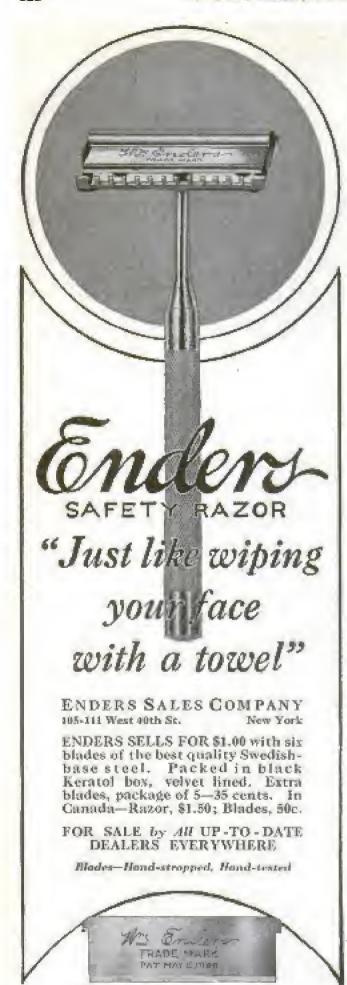
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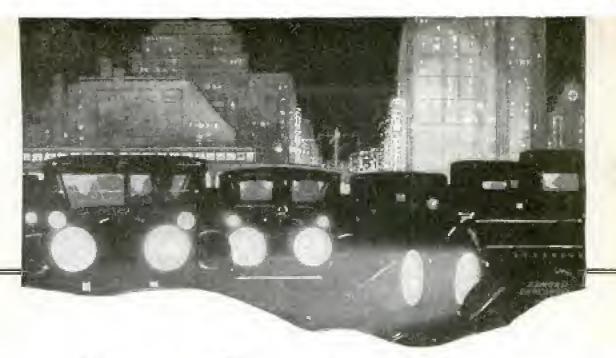
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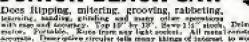
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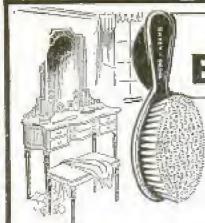
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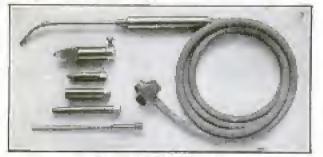
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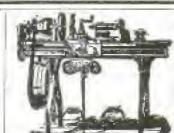
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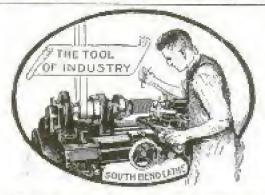
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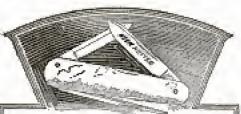
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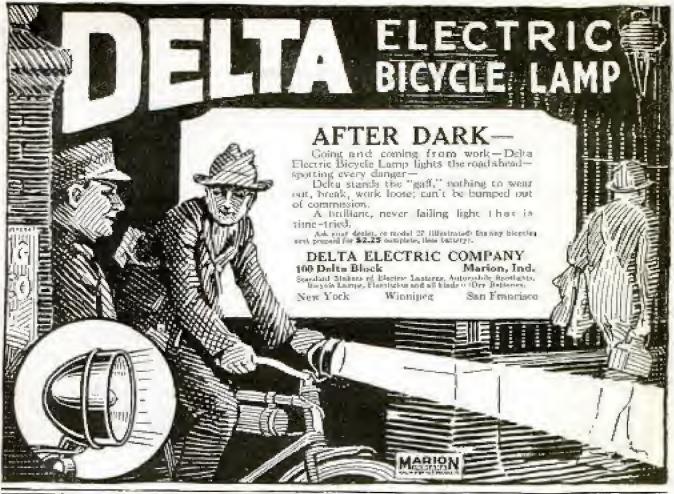
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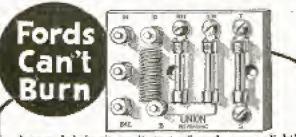
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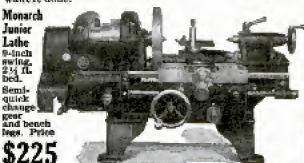




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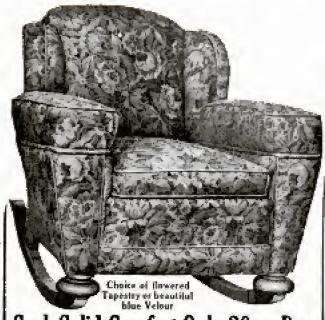
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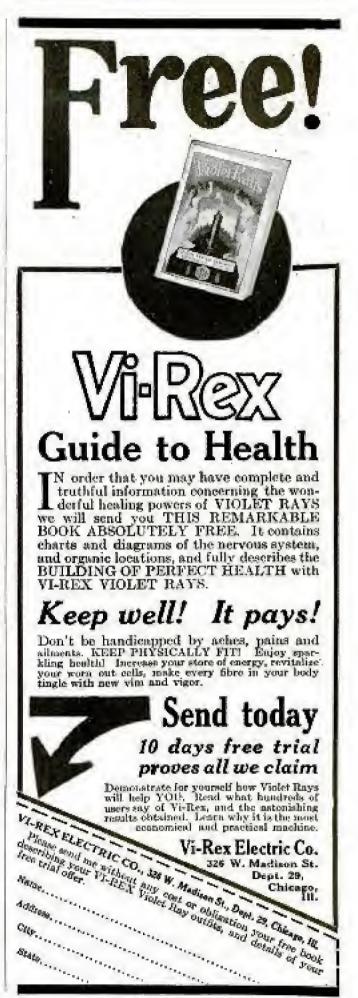
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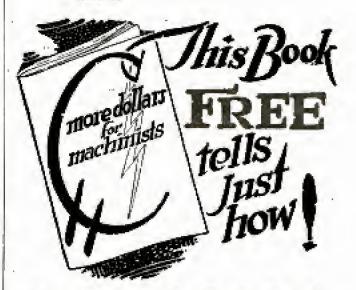
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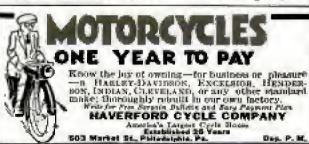
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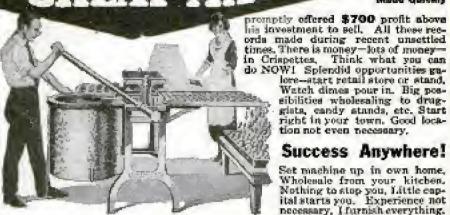
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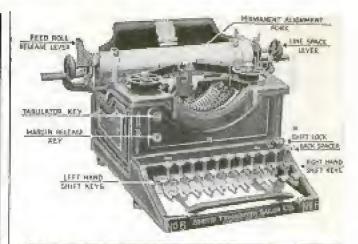
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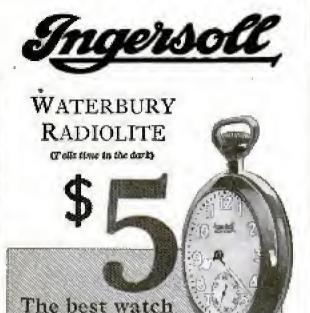
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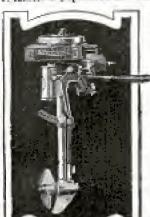
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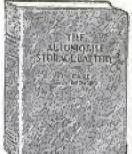
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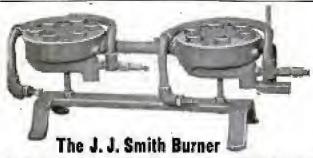


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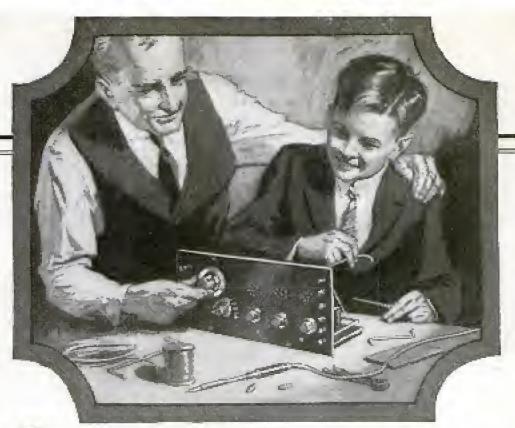
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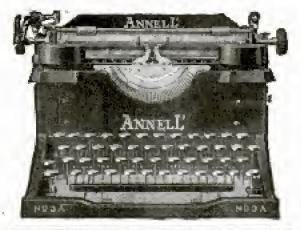
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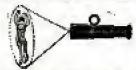
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### **Amazing Home Cleaning Invention Brings New Freedom to Housewives**

Again invention has triumphed over labor in the home. A wonderful device that does all home cleaning by electricity—new freedom to housewives from the most arduous and wearing part of housework. This new invention is not limited to the sweeping of floor covering only; for without the use of extra, cumbersome, impractical attachments, all kinds of sweeping, cleaning and dusting about the house can be done. The new Air-Way is the ultimate and long sought for invention that is a practical and thorough house cleaner. It is of almost unlimited utility in keeping the household in perfect cleanliness.



#### Does All Extra Dusting and Cleaning Through Hollow Suction Handle

When you see the new Alr-Way you will marved at this great improvement which uses the handle for cleaning purposes. The Air-Way cleans carpets and rugs on the floor even more efficiently than the best aid style electric vacuum cleaner. Yet this is only a small part of necessary house cleaning. With the Air-Way, when you finish the carpets and rugs, you just men the machine about, reverse the suriou, and do all kinds of cleaning through the holiuw section handle.

The marshous light wight and parket helman

the hollow section handle.

The marridous light weight and perion datange sending you to handle the tow Air-Way in simily you to handle the tow Air-Way in simily dry you would poly a history handle. You don't have to cloud so a step hadder to nearly all the high parts, because you can exist weight had deen being to with the Air-Way at mema heagth and clean being to with the Air-Way at means heagth and clean to the work the Air-Way and the duel from the periods in which there is the headth, and can the tops you woulding, and set the colored forther the remark of a duel and third over deer chairs, and and of over duely the section, and a burdled and one hard-to-peti-st given. In addition you can glean all the uphilabreat duell one, deep reached and markeness, take of markeness, the

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Tet the holice rection herdic is only out of the fire west har-Play improvements, which give it universal utility in the home.

is universall others in the home. Space in this arrogatement is not sufficient for a description of all these improvements. Each, justices, in on new databasety in the hullion particle has pilled great, in on new databasety in the hullion particle hapille, multiplies the stilley of this new database, and exist places are averaging that is desired by every version as mustice how who is new databased by every version and mustice how who is new databased through sevelutionary staces. From the brown and does pen to the capte everyon, then to the electric version flow electrics, and now so this great, revolutionary, complete home element, which is offered as a nominal price, which avery bone can afford.

## Clir-Way

#### Complete Electric Home Cleaner

This new appliance cannot be compared with any vacuum cleaner or sweeper that you have ever seen or heard about. It is fundamentally different, both in its design and its utility. The inventor has disregarded all the accepted standards of vacuum cleaner construction, and has created a device with a multitude of uses, which in addition is so light in weight and so easy to use that a child can carry it and use it from cellar to attic.

Not only does it clean carpets and rugs more thoroughly, quickly and easily, but you can just turn the machine around and clean a hundred different places through the hollow suction handle. Note illustration on the left and description of the ninazing advantages derived from this single improvement. Then remember that in this new deaning device there are four additional and just as revolutionary improvements. Everywhere this new machine is shown, women instantly recognize its multiplied advantages, because it

#### Sweeps, Cleans, Dusts All Floors, Furniture and Furnishings Without Extra Attachments

In other words, the new Air-Way is a complete home cleaning appliance all in one unit—no extra attachments to buy or adjust or bother about. It is always ready for all kinds of cleaning throughout the house. Furthermore, it weighs less than half and costs less than other electric cleaners on the market, which are good for cleaning carpets and rugs

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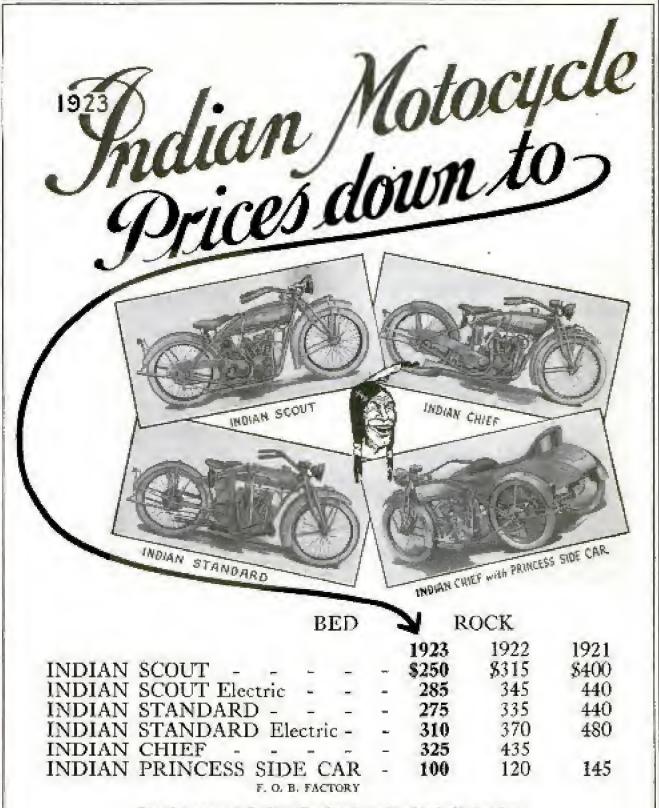
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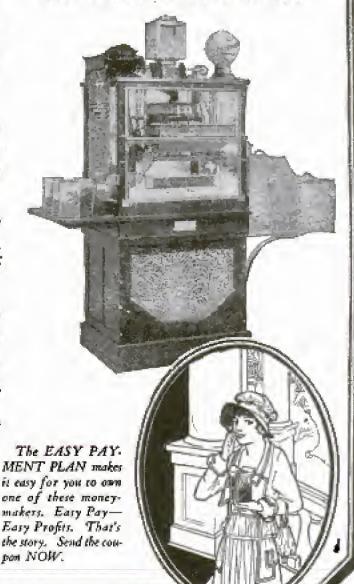
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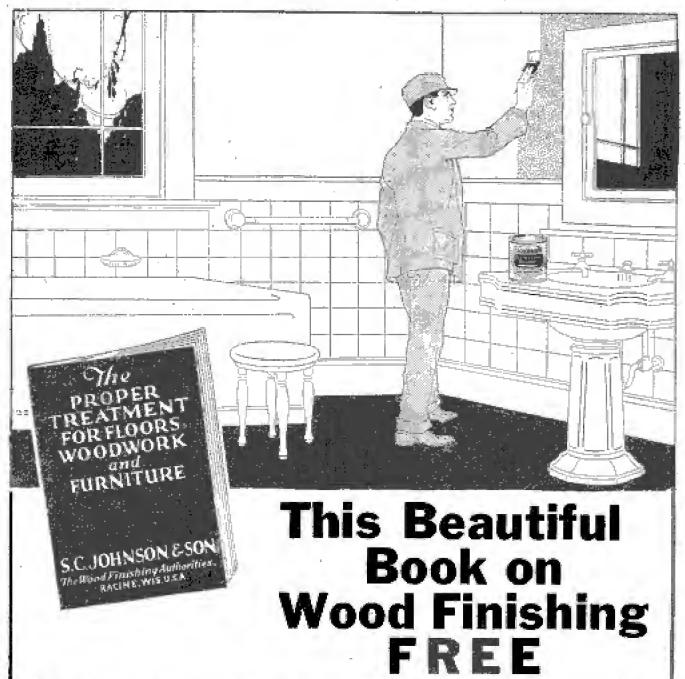
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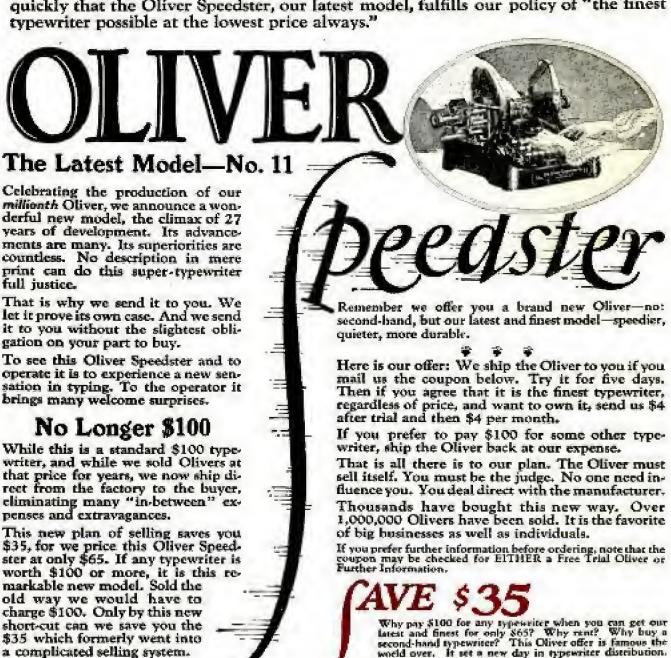
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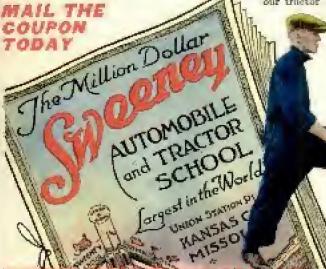
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